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The Nine Hour Day.

The last day on which it is possible to write anything to go into this issue of the "American Machinist" happens to be the day set for the cessation of work by those machinists who have been demanding the nine-hour day and are determined to get it by striking if it is to be obtained in no other way. And so, by the time this number reaches our readers, most of them will have a pretty good idea as to how much the movement for the shorter day will amount to. At this writing very little can be predicted as to the outcome. All sorts of reports are being published from all parts of the country, according to which reports some important manufacturers are granting the nine-hour day, others are determined to resist it to the utmost, and still others have made a compromise arrangement. About the only fact that appears to stand out clearly at this writing is that the men are much more generally organized and determined to fight if need be in the larger towns or rather in the more important manufacturing centers than in the smaller places, where the conditions of life generally are somewhat better for workingmen, and there are but few local establishments in which men can get employment, so that not much shifting of employees can take place within the town.

Whatever may be the result of the present struggle it seems unlikely that the movement for a shorter working day will die out until the shorter day is secured on some terms. That seems to be the tendency of the times.

A rather unusual view of the affair was taken by the proprietor of a shop located in New York. He said he was considering the matter of granting the shorter day, or at least of trying the experiment (for he did not consider that if he did try it he would be obliged to stick to it unless it became general), and he said that the more he thought of the matter the more it seemed to him that it might after all make little difference to him whether his competitors granted the shorter day or not; for he believed that if they did not, he, running his shop on the shorter day, would soon, by the shifting of men which is always taking place, have the best men. And he said he knew that there was a good deal more difference between an ordinary or a rather poor mechanic and a first-class one than the difference in time worked per day or the difference in the hourly rate would come to. And so he thought that if his competitors granted the shorter day he would be on the level with them, while if they did not there would after all perhaps be some compensation for him if he were the only one in his line to adopt it.

One feature of the present case is, we think, especially regrettable, and that is that there should have been the least opportunity for the belief or the charge that the men have not lived up to what is known as the New York agreement. The Metal Trades Association charge that this agreement has been violated by the men, or rather that it will be if they strike, and unless they can be shown or convinced that this is not true it will be doubly difficult to come to any satisfactory agreement in the future regarding anything whatever. Both sides must have every reason to believe that deliberately made agreements will be strictly lived up to or there is no hope of amicable relations or permanent peace. It is vitally necessary that agreements shall be so drawn as to be subject to only one reasonable interpretation and then they must be strictly observed as a condition precedent to any businesslike or at all satisfactory arrangement.

The world's work is now largely done by machinery of one kind or another, and if it is true as many claim that a reduction of time by 10 per cent. will mean a corresponding reduction of production, then, except where the increased cost will operate to lessen demand, more machinery will be called for to do the work required and machinery builders are bound to get thereby some business they otherwise would not get. Nothing is more certain of course than that any increased cost of machinery that operates generally must eventually be paid by those who make use of machine-made goods and among these are the men themselves who make machinery.

Mr. Schwab's Testimony.

As our readers know, we have taken the position that mere combinations of separate manufacturing establishments under one ownership are not to be condemned on grounds of public policy. We believe that men have a right to combine their capital and to buy with it as many manufacturing establishments as they please. Moreover, we believe that such manufacturing establishments so combined cannot establish an oppressive monopoly so long as they remain manufacturers only. But there is in the recent testimony of C. M. Schwab before the Industrial Commission evidence that the steel company of which he is the nominal head is much more than a manufacturing concern. He stated that the company now owned about 80 per cent. of the iron ores of the Northwest—owned 60,000 acres of Connellsville coking coal land and he expressed the opinion that the public generally, nor in fact the members of his own company generally, were inclined to place a value upon these equal to their real value; by which he really meant their monopoly value, *i. e.*, the value to their owners of the ability to prevent others from competing with them on even terms, no matter how much capital or skill might be available for the enterprise.

He also said that in his opinion the tariff ought not to be disturbed. He said that it had been and would be the policy of his company to sell abroad at lower prices than here in order to hold the markets, which of course means that he thinks his company should be given protection to enable it to charge American machinery builders and other users of steel "all the traffic will bear" while they at the same time sell to the foreign competitors of these American machinery builders American steel at considerably lower prices. In this we do not think many of the machinery builders of the country will agree with him. We have too high an opinion of their intelligence to believe that they

will sustain any such policy. It is true that Mr. Schwab spoke of selling his surplus in foreign markets at a loss, but we don't believe in this selling-in-foreign-markets-at-a-loss story to any great extent. In other words, we take no stock in it whatever. It is, however, easy to see how such a loss can be figured to show upon the books of the company. For instance, the more completely this company is shielded from the possibility of competition the more valuable its coal and iron mines will become. If the tariff by shutting out the possibility of foreign competition makes these monopolies worth to the steel company, say, 45 per cent. more than they otherwise would be, then the cost of the coal and of the iron ore figured on that basis might make the steel sold abroad seem to be sold at a loss simply because it was not sold here to American users at a monopoly price; but we miss our guess if machinery builders who have been learning something of foreign business during the past few years can be made to feel any great sympathy for such losses.

We know that American tool builders who have been selling their tools abroad have not sold them there at prices lower than they sell them for here. The simple reason for that is that tool building is a strictly competitive business and few, if any, tool builders make more than fair living profits, taking one year with another, while many of them do not make fair profits above the value of their services. They therefore cannot sell abroad at materially lower prices than they do here without loss and they do not suffer such losses on their foreign trade nor pretend that they do, and we think we know what we are talking about when we say that very few of them will be disposed to have much patience with the plea that the company from which they must buy their supplies of steel must be protected in this market so that it can collect from them prices considerably higher than are charged for the same steel sold to foreign machinery builders whose competition must be met in order to do business in Europe.

Mr. Schwab may be all right when he is telling boys about the baleful influences of a college education and how industry is sure to lead to success, but we can point him to plenty of men who have been just as industrious as he has been for more years than he has lived, but who have not been successful as measured by his standard, simply because they have been workers and not monopolists. And by this we do not mean only those who have worked with their hands, but those also who have been at the head of manufacturing enterprises and large employers of labor. And business men who know something of the world are apt to look a little more deeply into things said by Mr. Schwab than are a class of school boys.

Meeting of the Mechanical Engineers.

The regular spring meeting of the American Society of Mechanical Engineers will be held at Milwaukee, May 28 to 31, inclusive. The headquarters of the Society and the hall for the meetings will be at the Plankinton House. The usual arrangements have been made for the transportation of members and visitors for one and one-third fare for the round trip. The local committees have made arrangements for entertaining the party and for conveying them to the various points of interest. The list of papers to be read at the meeting, as given below, is of unusual variety and interest:

Report of Committee on Standardization of Methods of Making Engine Tests.

W. S. Aldrich—"Requirements of Electricity in Manufacturing Work." John Riddell—"Portable versus Stationary Machine Tools." Geo. A. Hutchinson—"The Practical Application of Superheated Steam." E. H. Foster—"Superheated Steam." F. O. Ball—"Drafting Room and Shop Systems." H. G. Reist—"Blue Printing by Electric Light." A. W. Robinson—"Rules for Drawing Office." A. J. Rossi—"Influence of Titanium on the Properties of Cast Iron and Steel." Wm. E. Reed—"A Few Instruments of Precision at the Paris Exposition of 1900." Fred J. Miller—"Bevel Gear Cutting Machines at Paris." Storm Bull—"The Locomotive Exhibits at the Paris Exposition of 1900." C. W. Hunt—"New Connecting Rod End." Geo. H. Marr—"Method of Filing and Indexing Engineering Literature, Notes, Data, etc." Wm. O. Webber—"A Filtration Plant at Albany, N. Y."; also "Tests of an Hydraulic Air Compressor." Bardwell & Hamilton—"The Bardwell Votometer." Chas. H. Benjamin—"Some Experiments on Ball Step-Bearings." F. H. Stillman—"Pulley Press Valve." J. I. Astrom—"Determination of Flywheels to Keep the Angular Variation of an Engine within a Fixed Limit." W. S. Russell—"A Special Form of Boring and Facing Machine." C. H. Robertson—"Efficiency Tests of 125 Horse-Power Gas Engine." J. R. Fordyce—"A Method of Preparing and Baling Cotton in Round Bales." M. P. Wood—"Protecting Ferric Structures." F. H. Daniels—"An Improved Type of Ingot-Heating Furnace." H. H. Suplee—"The Entertainment of the Visiting Engineers in Europe in 1900."

Engine Builders' Association.

The Engine Builders' Association of the United States will hold a meeting Monday and Tuesday, May 27 and 28, at Indianapolis. An address of welcome will be delivered by the president, Prof. John E. Sweet, and professional papers will be presented on the following subjects:

"Experience with Throttling Engines," by Prof. J. B. Stanwood, of Cincinnati; "The Engine, the Heart of the Modern Building," by C. G. Armstrong, Chicago; "The Relation of Architects to the Engine Builder," by Samuel H. Brubacker, Indianapolis, and "Conditions and Warranties of Construction Contracts," by Edward H. Burdick, Syracusse.

On Monday evening an informal smoker will be held in the rooms of the Commercial Club and on Tuesday evening will be held the association banquet.

Legal Notes.

WM. MARSTON SEABURY, LL.B.

WHEN EMPLOYER IS RESPONSIBLE FOR FELLOW-EMPLOYEE'S NEGLIGENCE—MAINE RULE.

Albert E. Small, while employed by the Arlington & Curtis Manufacturing Company, received injuries to recover damages for which he afterwards brought suit in the Supreme Judicial Court of Maine. At the time of the accident Small was engaged with others in the work of hoisting and placing in position a large metal appliance to be used for the purpose of collecting dust and known as a "dust collector." While the collector was being hoisted into position by means of the ropes and blocks, or the double fall and tackle, the blocks came together and it became necessary to unfasten the tackle and rearrange the blocks.

While this was being done, the collector fell a few feet, and Small, who was on top of the collector, was thrown to the roof of the boiler house near by and sustained severe but not very serious injuries. Small brought suit against his employers and received a verdict of $500 in the trial court. It was argued by Small that the accident had occurred through the neglect of the employers' superintendent, under whose guidance the work was carried out, and that this superintendent, by reason of his entire command and control over the operations, was not a fellow-servant of the plaintiffs but was a vice-principal of the employer for whose acts he must be responsible. In granting a new trial to the defendants the court, in disposing of this point, said: "The doctrine that a superior servant is on that account a vice-principal representing his master rather than a fellow-servant with others employed in the same work, does not prevail in this State (Maine) and is not supported by the weight of authority. . . . A servant of any grade may be employed in the discharge of the particular and personal duties which the master owes to the servant, as when he is engaged in the duty of providing safe, suitable and sufficient machinery and appliances. While engaged in such employment, although at other times he may be only a fellow-servant with other employees, he becomes a vice-principal and his master is liable for his doings, because the performance of these duties cannot be delegated by a mas-

ter so as to relieve himself from the consequences of negligence in these respects. The test which determines the master's liability for the negligence of one employee whereby injury is caused to another is the nature of the duty that is being performed by the negligent servant at the time of the injury, and not the comparative grades of the two servants." (48 Att. R. 177.)

Technical Publications.

"Saw Filing and the Management of Saws." By Robert Grimshaw. New revised and enlarged edition. 93 4x6¼-inch pages, with 81 illustrations. N. W. Henley & Co., New York. Price $1.

This book discusses the proper shapes of saw teeth for cutting wood, with illustrations of file guides, setting and gumming tools. Other subjects connected with the management of saws are also included.

"Hand Book of Practical Mechanics." Second enlarged edition. By Chas. H. Saunders. 227 4x6-inch pages, with many illustrations and tables. Published by the author, 216 Purchase street, Boston, Mass. Price, in cloth, $1; in leather, with flap, $1.25.

This book has already been noticed in our columns, but inasmuch as the second edition is more than doubled in size, we are glad to notice it again. It may be described as a machine shop pocket book. It does not aim to cover the large field of the regular engineer's pocket books, but to give many tables and data which are needed in the shop but which do not find a place in the usual pocket books. Thus we find tables for the Acme screw thread, for worms and worm hobs, standard taper sockets, tapers in inches per foot and in degrees and minutes, Woodruff keys, screw thread micrometer calipers, standard metric threads, metric diametral pitch gears, change gears for spiral milling, milling cutter and twist drill speeds, rules for screw cutting and many other things of special interest to the machinist and toolmaker.

"Notes on the Design of Machine Elements," for use in connection with Unwin's "Machine Design, Part 1." 183 5¼x7½-inch pages, with 74 illustrations. By J. H. Barr. Published by the author, Ithaca, N. Y.

As indicated by its title, this book has been prepared to accompany Professor Unwin's well-known work, the two together forming the course of study in the design of machine elements at Cornell University. The various topics are discussed in much the same spirit as in Unwin's work, and the same notation is employed. In some subjects—for example, springs, in which Unwin's book is deficient—Professor Barr's discussion is practically an outright addition; in others the additions are such as to modernize the subject and include the most recent information, while in still others the principal additions are the results of American investigations, which Professor Unwin seems largely to have ignored. Those who can read Unwin's book will have no difficulty with this, and all such, on this side of the Atlantic at least, will find it to largely increase the value of the book of which it is a supplement.

"Easy Lessons in Mechanical Drawing and Machine Design. Part 15." By J. G. A. Meyer and Chas. G. Peker. Industrial Publication Company, New York. Price, 50 cents.

We are glad to note that this publication—interrupted by the untimely death of Mr. Meyer—has been resumed. The following announcement to subscribers is made by the publishers: "At the time of Mr. Meyer's death, fourteen parts of the work had been issued, and the manuscript and drawings for the remaining parts were so far completed that they required only the usual editorial revision. These manuscripts and drawings have now been completed and arranged by Charles G. Peker, who was Mr. Meyer's assistant, and will make a thoroughly complete treatise on the subjects indicated in the title. We find, however, that, when finished, the book will not extend quite to the twenty-four parts originally announced by Mr. Meyer. A close calculation warrants us in promising twenty parts, some of which may be of extra size, but without additional charge to the subscribers. We have therefore decided to issue it in twenty parts at 50 cents each. Part 15 will be issued May 1, 1901, and the other parts will follow at intervals of about two months. We trust that under the unusual circumstances of the case, this will be satisfactory to both old and new subscribers."

An up-to-date circular of a liquid-air company offering its stock for sale says: "We are not trying to sell you a gold brick." If a man buys a "gold brick" he has a chunk of brass or other metal that he can sell for *something*. The statement makes it all right, however, because, as is well known, those who have gold bricks for sale always say so.

There is but one way to draw the temper of chilled cast iron, namely: break it in pieces and mix it with good Scotch pig or its equal, remelt and recast. This is the only practical method.—"Blacksmith and Wheelwright."

The National Export Exposition, which was held some time ago, has, on the recommendation of the Franklin Institute of Philadelphia, awarded to the International Correspondence Schools, at Scranton, a diploma and medal "for a unique, thorough and comprehensive system of technical education by correspondence."

Commercial Review.

NEW YORK, Monday, May 20.

MACHINE TOOL AND GENERAL NOTES.

On page 578 is printed a table showing the distribution according to countries of our exports in most of the classified lines of machinery for the year 1899-1900. The following branches are omitted and are not included in the unclassified column at the extreme right: Cash registers, with a total of $813,096; laundry machinery, $441,562; shoe machinery, $1,163,265; fire engines, $14,915. These belong in the grand total of $55,485,465, which, aside from the embodiment of a few additions, due probably to late returns, is the same we published last August.

A machinists' strike such as is to-day being entered upon deflects the business compass so that it is hard to tell in which direction one is sailing. It has naturally furnished a burning theme of interest of late in machine-tool circles. It has had some effect, too, in retarding orders, at all events in the East. If the indications given by some of the afternoon papers to-day are true, and the strike is soon to be over, business will be freed from an incubus which ought to allow it a new lease of life before the summer sets in.

Authorities on the German market fail as yet to discover any thinning of the clouds in that quarter of the sky.

Hutchinson, Hollingworth & Co., Ltd., loom makers of Dobcross, England, propose to select some American machinery for the new extension to their gear-cutting department. Mr. Hollingworth, whose trip to this country is announced in our personal column this week, proposes to attend to the matter while here.

The Brown-Corliss Engine Company has just been incorporated with $1,000,000 capital stock and Walter F. Brown, Walter G. Whiting and Julius Wechselberg incorporators. We made preliminary mention of the concern as long ago as January. It has now arrived at a stage where it proposes to go ahead with its plant, which will be located at Western Union Junction, near Racine, Wis. About 300 men are to be employed at first.

The Bullard Machine Tool Company has taken quarters at 139 Liberty street, corner Washington street, New York, which it will use for exhibition as well as office purposes and will fit up with samples of its machinery. The establishment is in charge of N. B. Lyons.

The Brown Hoisting Machinery Company, Cleveland, Ohio, whose works suffered from fire some time ago, has taken out a permit to rebuild. A steel structure will be erected at a cost of about $375,000. It will be 312 by 500 feet and from 40 to 60 feet high. The company is expected to be purchasers of a considerable quantity of machine tools for the plant.

Among the machinery that has been ordered for the new British Westinghouse

plant are four pneumatic riveting machines from John F. Allen, 370 Gerard avenue, New York, to be delivered in October. They will have a reach of 25 inches, gap 15 inches with 12-inch cylinders, and will be capable of driving 1¼-inch rivets. Mr. Allen has recently filled large orders for several prominent concerns in the United States and Canada, the Pennsylvania Railroad among them.

The New Process Raw Hide Company, Syracuse, N. Y., has recently shipped one of its New Process noiseless pinions to Germany to be used on the private yacht of Kaiser Wilhelm.

The number of cotton factories, including spinning and weaving mills, in India, rose from 350 in 1895 to 586 in 1899, while engineering shops increased from 72 to 82, jute mills and presses from 62 to 82, rice mills from 65 to 84, and sugar factories from 9 to 14 during the same period. This shows that there has been a good increase in average value of imports of machinery and mill work. The Government of India has decided to establish a rifle factory in the country.

An attempt has been made in the Swedish Parliament to pass a bill raising the duty on electrical machinery from 10 to 20 per cent. ad valorem. This is believed in Germany to be directed particularly at the imports from that country. The view is taken that Sweden has more to lose than to gain from the action.

BELGIAN EXPORTS OF GUN BARRELS TO THE UNITED STATES.

An interesting growth has taken place in the last few years in the exports of gun barrels from the consular district of Liege to the United States. Consul Alfred A. Winslow writes to the State Department as follows:

"Trade between this consular district and the United States is undergoing important changes, generally to the advantage of the latter. The consumption of American-made goods here is several times as great as it was three years ago. It is a very common thing to see in a Liege shop window a show card bearing the word 'Americaine.' In some cases, however, the articles are imitations. Goods manufactured in the United States meet with a much more ready sale than formerly, and usually at a considerable advance in price, since their great superiority has come to be so generally recognized.

"The change in the variety and quantity of goods shipped to the United States is also very marked. It is interesting to note that more than one-third of the firearms imported by the United States from this district are in the shape of gun-barrel tubes, rough bored and forged. Prior to the 1897 tariff law and for a year thereafter, a shipment of gun barrels was a rare occurrence, and when one was made it was of high-grade Damask barrels.

"During January, 1900, there were shipped to the United States 18,664 gun-barrel tubes, valued at 83,521.13 francs ($16,118.59), and for February 18,519 tubes, at 85,163.34 francs ($16,436.52), against for January of this year 24,391 tubes at a value of 103,055.96 francs ($19,889.80) and for February 27,171 tubes at 112,055.37 francs ($21,626.69). It will be noted that a year ago the average price for a gun-barrel tube was 86 cents, while this year the average is 80 cents, and the quality of the goods shipped is said to be better.

"Had the 37,183 gun-barrel tubes exported during January and February last year been made into guns, and shipped to the United States, as they were prior to 1898, they would have represented a value of at least $111,549, instead of $32,555.11, and those for the same time this year $154,686, instead of $41,516.49.

Guns that were shipped to the United States prior to 1897 at from 30 to 33 francs ($5.79 to $6.37) are now sold at from 23.50 to 25.40 francs ($4.54 to $4.90), and in most cases the quality of the guns is far superior to what it formerly was. About four-fifths of the guns exported to the United States from here are machine made. The parts are interchangeable and are far superior to the hand-made articles sold at the same price. Nearly all the machinery used in the manufacture of these guns is imported from the United States.

"Another feature of the gun trade of particular interest is its centralization. At present, 75 per cent. of the guns sent to the United States are shipped by four firms, whereas formerly there were twenty about equally represented."

CHICAGO MACHINERY MARKET.

It is doubtful if the demand for machinists' supplies in the West was ever greater than now, which means that shop activities are running at top notch. There is no departure from that uniform report among prominent factors of the trade. Sometimes the remark is made that inquiry has slightly fallen because of the unsettled wage issues, but even in the face of that situation the business is pronounced unprecedentedly good. This is all the more remarkable from the fact that prices are now lower than a year ago. By way of change in prices there are now no definite tendencies. Quotations are generally held even, with slight indications of variation either upward or downward. Occasionally complaint is heard that deliveries are slow, but, when so, a week or two generally brings around the deferred shipments. The delays are not serious. They refer usually, moreover, to special lines of manufacture.

C. H. Besley & Co. report that trade was never better. Samuel Harris & Co. make an equally good representation. The Hodge & Homer Company say trade this year is 25 to 33 per cent. better than in 1900 and that thus far it shows no signs of diminution. The gains are perceived both in shop tools and supplies and in builders' supplies. For vises, carpenters' tools and similar lines there is activity of pronounced character.

Shop fittings are not so signally buoyant, but there is here also a type of activity, though of a plainer and more subdued pattern. Facilities for turning out pulleys, shafting, belting, etc., have improved, and while many producers are running full or overtime, others could take care of a few more orders. This competition is in evidence and it is the favored in facilities and economies of production who get the business. The W. A. Jones Foundry & Machine Company have many orders booked ahead and are running overtime. The A. Plamondon Manufacturing Company are much busier than a year ago. Their activity is, however, more pronounced in special lines than in products which enter into general competition.

The Dodge Manufacturing Company say trade is satisfactorily good, better than last spring, better than a month ago. Some new plants are being equipped, but perhaps the greater volume lies in the fitting and refitting of old plants with power-transmission appliances.

The Armstrong Bros. Tool Company have removed their general offices from 106 and 108 West Washington street to their new factory and warehouse, 617-621 Austin avenue.

Quotations.

NEW YORK, Monday, May 20.

Pennsylvania Foundry Pig Irons, Jersey City delivery, good brands:

No. 1 X	$15 00 @ $16 00
No. 2 X	15 10 @ 15 75
No. 2 plain	14 50 @ 14 75
Gray forge	14 25 @ 14 50

Alabama Pig, New York delivery:

No. 1 foundry, or soft	15 50 @ 15 75
No. 2 foundry, or soft	15 00 @ 15 25
No. 3 foundry	14 50 @ 14 75
Foundry forge, or No. 4	14 25 @ 14 50

Bar Iron—Base sizes—Refined brands, mill prices on dock, 1.55 @ 1.65c.; from store, 1.80 @ 1.90c.

Tool Steel—Base sizes—Good standard quality, 7c.; extra grades, 10c. and upward.

Machinery Steel—Base sizes—From store, 1.90 @ 2.00c.

Cold Rolled Steel Shafting—Base sizes—From store, 2½ @ 2¾c.

Copper in carload lots—Lake Superior ingot, 17c.; electrolytic, 16⅝c.; casting, 16½ @ 16⅝c.

Pig Tin—27¾ @ 28c., for 5 and 10-ton lots, f. o. b.

Lead—For wholesale lots, 4⅜c., with .02½ @ .05c. extra for carloads.

Spelter—4.00 @ 4.05c., New York.

Antimony—Cookson's, wholesale, 10⅜ @ 10½c.; Hallett's, 8¼c.; Hungarian and Italian, 8⅝c.

Lard Oil—Prime City in jobbing lots, 65 @ 67c.

A Modern German Machine-Tool Shop, the Deutsche Niles-Werkzeugmaschinen-Fabrik—II.

Resuming our description of these recently completed Berlin shops and returning to the drafting room, the sliding door near the center of its rear wall will be found to divide it from the pattern-shop; a second iron hinged door serves to keep possible fire from passing from one room to the other. The view Fig. 15 was taken through this door.

FIG. 15. VIEW IN PATTERN SHOP.

The various planers, band and circular saws are conveniently distributed down the center with abundant space between for a warming table, glue boilers and the building up of larger patterns. Nearer the sides there are some thirty pattern-shop benches of a special design devised here. A liberal supply of trimmers of various sizes is distributed on or handy to these benches. Along the walls are a number of lathes of various sizes, among others one of 12-foot swing for facing. All of the machine tools are driven by direct-connected individual motors, which is of very great convenience, as the tools can be placed where wanted, have no belting, and are started and stopped by the mere turning of a light-button switch. The foreman's and tool rooms are located at the upper end; the tool room is fitted with the machines required for keeping the planers, saws, etc., in trim, such as planer-knife grinder, automatic bandsaw file, etc., as well as the necessary bins for storage of various small supplies and hand tools. Exhaust hoods at the various machines and normally-covered sweeping holes in the floor serve to keep the shop clear of shavings and chips. The various pipes are carried through the floor along the ceiling of the dining rooms located below. At the lower end of the pattern shop there is an electric rope hoist with horizontal traveler to bring up lumber from and deliver patterns to trucks on the narrow gage railway below.

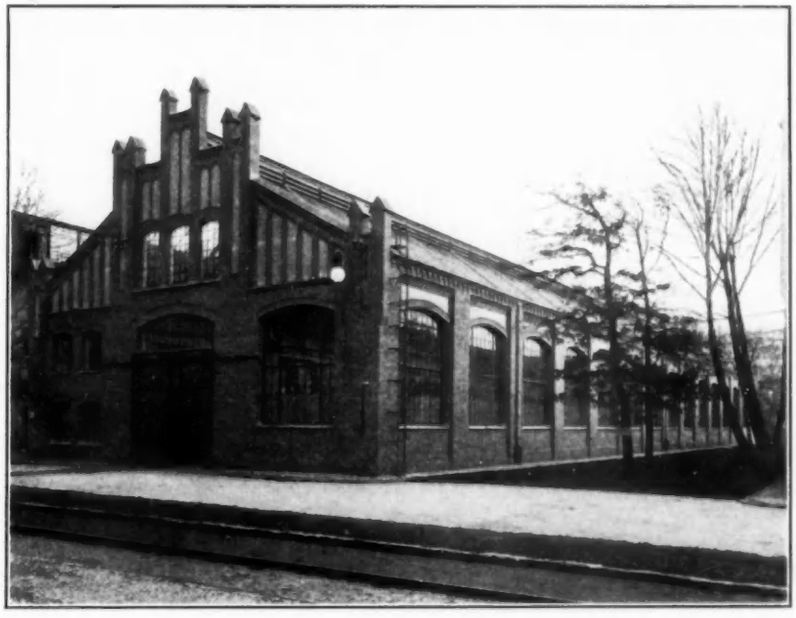


FIG. 16. FOUNDRY.

BLACKSMITH SHOP.

Descending the stone stairs at the rear and heading once more for the central street brings us to the front of the blacksmith shop of Fig. 16, of which Fig. 17 is an interior view taken from near the front door. There is at present about this shop an air of limitless space not at all comforting to the foreman who feels himself at home only in crowded and cramped quarters.

As a matter of fact it was deemed ultimate economy to build this as well as the other subsidiary shops of the full capacity of the ultimate plant. The main shops were designed for rather more than two and one-half times their present capacity

FIG. 17. VIEW IN BLACKSMITH SHOP.

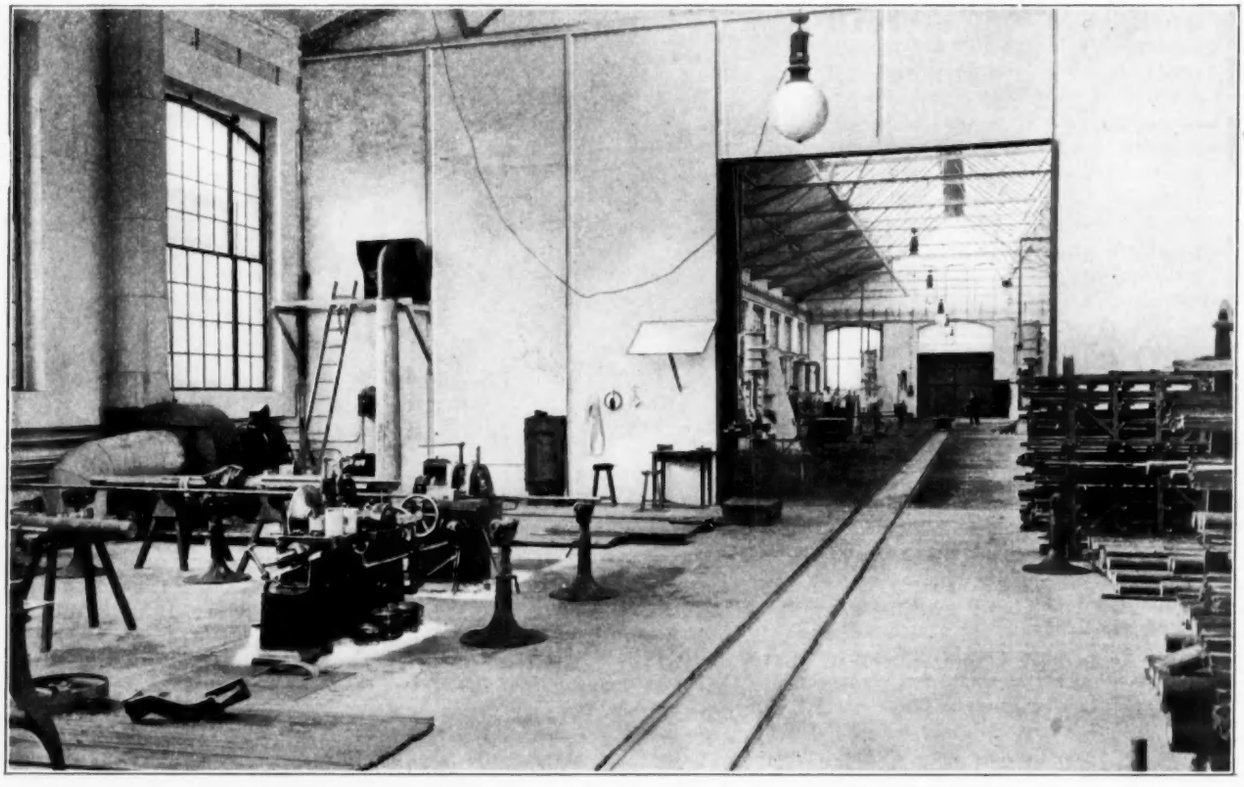


FIG. 18. VIEW FROM STOCKROOM AND CUTTING-OFF ROOM, LOOKING INTO BLACKSMITH SHOP.

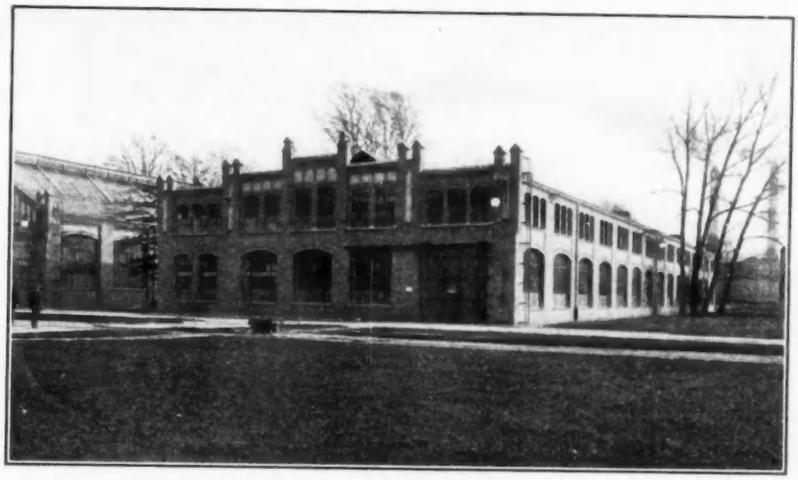


FIG. 19. PATTERN STORAGE HOUSE.

centering room at the rear end of the smith shop, shown in Fig. 18.

On one side of this storage room are placed racks for the various materials, while that opposite accommodates two cutting-off saws, a power hacksaw, a straightening machine and several centering lathes. In the corner are also placed the large smoke exhaust and smaller blast fans, both individually motor driven. Ventilation through the shutters at the apex of the wire-glass roof and the fan exhaust combine to keep the shop entirely clear of smoke. The floor is of the natural local sand with a surface of forge cinders. The storeroom floor is cement.

PATTERN STORAGE.

An exit through the rear door and a short turn toward the water bring us to the pattern storehouse of Fig. 19. This is divided by double iron fireproof sliding doors on either side of fire walls extending above the roof into three similar compartments. A narrow-gage track runs along one wall and across the street to the foundry. The ground floor is devoted to the storage of large patterns, while a gallery running around all four walls is provided with racks for the smaller patterns. Light is received from side windows and a central skylight. That division nearest the front end is used as a general small stores room (Fig. 20). This is the only building having interior wood construction; but this was chosen, as under the great heat developed by burning patterns the wooden columns and beams will stand longer than iron work and in collapsing will not take the walls with them. This view was also taken by the insurance companies, while the entire cost of the building was lessened some 30 per cent.

BRASS FOUNDRY.

Leaving the storehouse and crossing the lawn we reach the brass foundry, with its

and then cut down, so that future extension will be along harmonious, fully considered lines. In all of the walls that face in the direction of such extension the structural iron work for roof trusses, crane guiders, etc., is already built in.

Returning to our blacksmith shop, cast-iron forges of various sizes are arranged along one wall with short uptakes connected with down-comers against the walls to an exhaust flue under the floor. Blast-wind is supplied by a separate underground pipe line further out from the wall. Similar exhaust and supply lines are placed also along the opposite wall. The three hammers shown, of eight, sixteen and twenty-five hundred weight, are driven by compressed air at about 90 pounds per square inch. At the upper end there is a case-hardening surface and a bolt forging machine with individual motor drive. The track running down the center connects with the machine shop across the way and also runs through the storage, cutting off, straightening and

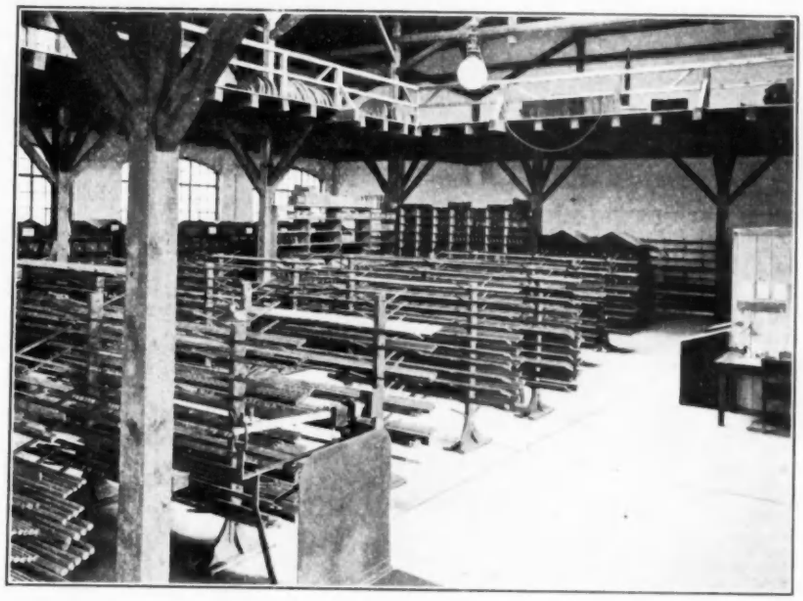


FIG. 20. ONE DEPARTMENT OF PATTERN STORAGE HOUSE, AT PRESENT USED FOR GENERAL SMALL STORES.

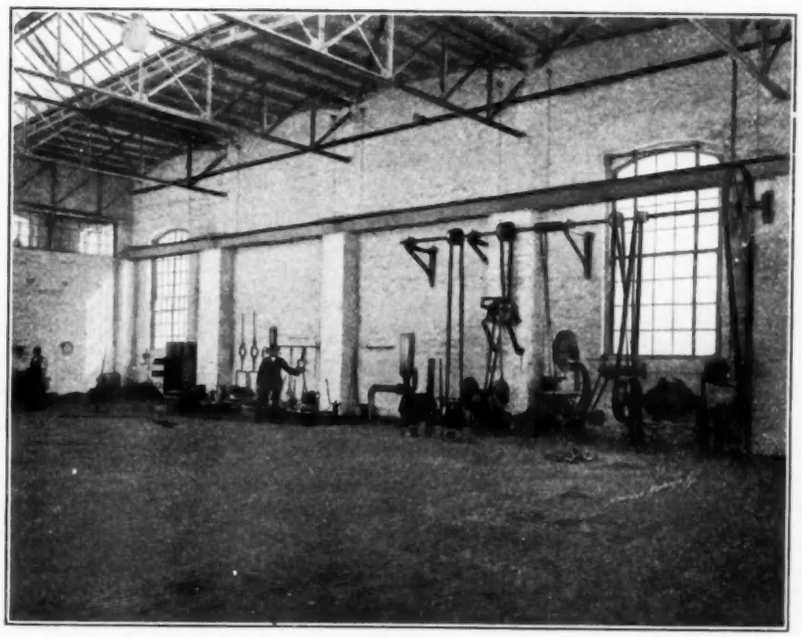


FIG. 21. VIEW IN BRASS FOUNDRY.

bank of four tandem gas melting furnaces and the usual supply of other tools, such as band-saw for cutting off sprues, rattler, molding benches, etc. The waste gases from the furnaces are carried to a "Millet" core oven. The floor is of vitrified brick, broken near one corner by a pit full of molding sand for large work. The narrow-gage track runs along the front wall and into a storage room for copper, etc., at one end. Above this is the foreman's room, with a glass front, completely overlooking the foundry. Fig. 21 is an interior view taken at an early date, when the space was but little occupied. As explained before, it was thought economical to provide more space than needed at first, rather than incur the relatively great expense of providing this enlargement later.

LUMBER SHED.

Adjoining the brass foundry is the lumber shed, all of open slat construction as to sides, in order to provide a free circulation of air to season the lumber. The track runs down both sides of this building; the lumber is stored inside the tracks, where it is well protected against all but almost horizontally driven rain. Leaving this shed, a hundred yards or so across a well-kept green lawn brings us to the banks of the Spree, to a portion greatly favored by the men in pleasant days during their noon hour; some giant specimens of horse-chestnuts furnish agreeable shade, while a few benches and the grassy slope afford a pleasant place to "invite one's soul" for a spare quarter of an hour. This bank is here protected by sound, well-anchored sheet piling, of 3x10 matched boards, with a horizontal string-piece at the water level to fend off canal boats. Somewhat farther along a higher quay wall of vitrified brick carries the largest wharf crane anywhere near Berlin; this is capable of raising 20 tons from the center of the widest canal boats plying on the river, and delivering it to either the narrow or wide-gage tracks.

COKE SHEDS.

A coke shed of brick is placed parallel to the main track near this crane. Through windows the coke is unloaded from the cars directly into a series of bins, from which it is again taken as required by narrow-gage cars. Abutting against the front end of this shed there is a partly subterranean bricked-in vault for the storage of oil casks that have been tapped. The space to the west of the coke shed is devoted to the storage of coal; a few sections of movable track serve to follow up the receding coal pile.

THE FOUNDRY.

Contiguous to this coal pile, and between parallel sections of track, is a stock of pig and scrap iron, properly sorted according to grades. Passing between these piles we reach an extension of the central foundry bay that is arranged to house two cupolas, each of 15 tons capacity per hour, but capable of melting 18 tons when forced. Of these cupolas only one is at present erected, but the spark chamber required by building law is built in for both.

All material, after having first passed a recording track scale immediately outside of the cupola house door, is carried by an electric elevator situated in the right-hand corner to the charging floor, which is made large enough and strong enough to hold material for a two days' run. The opposite corner of the cupola house accommodates a staircase for reaching the charging floor and an intermediate story on which the "Root" blower and elevating machinery are located. Fig. 22 is a view of the foundry from this lower end, while Fig. 23 is taken from the upper end and shows the large cupola at one side with the room left for its mate.

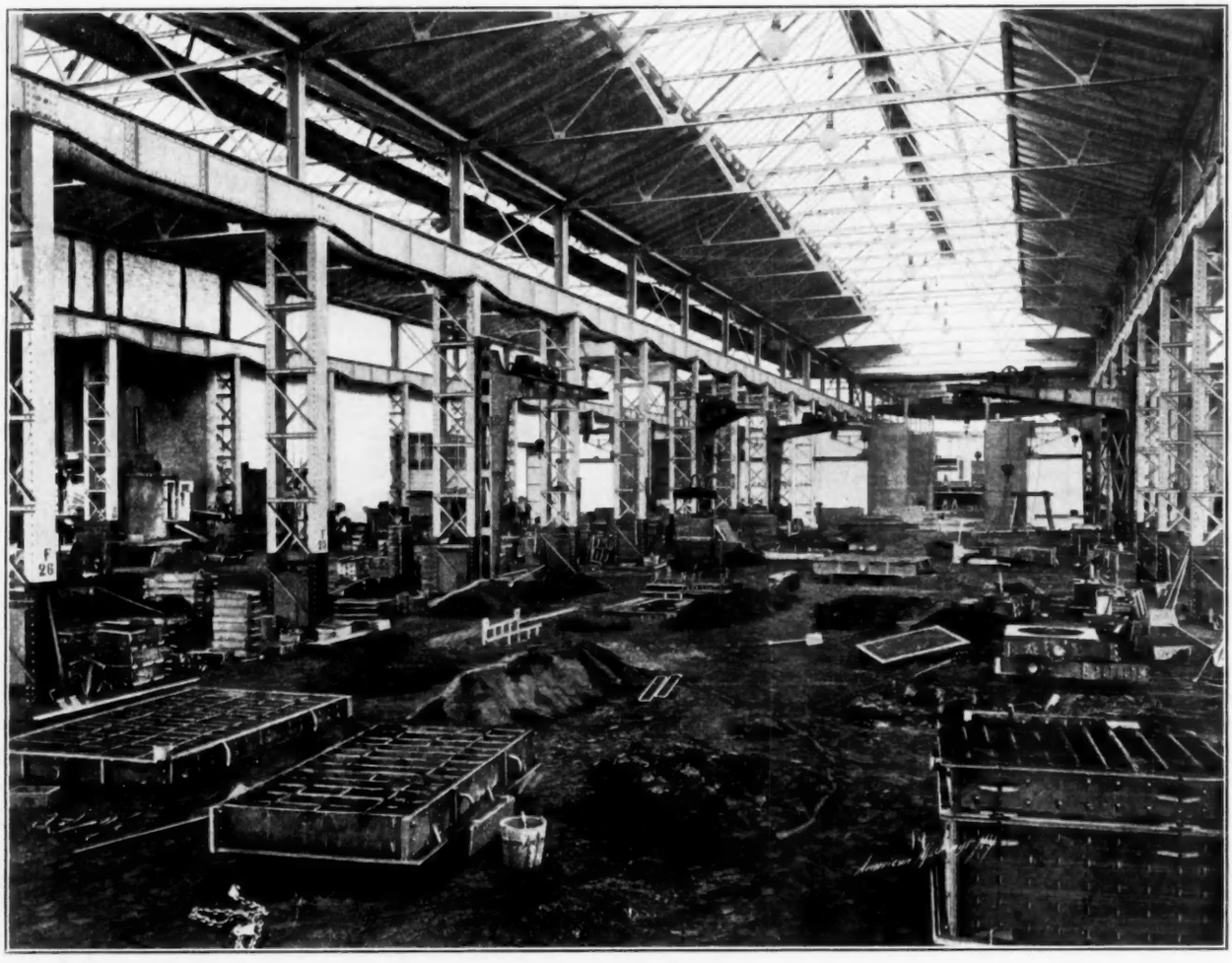


FIG. 22. VIEW IN FOUNDRY.

As is also noticeable from the general plan (published last week), the foundry consists of three longitudinal main bays, the central one of which is extended to form the large cupola house already described, or an annex to the left for two smaller cupolas; one of which, for 12 tons per hour, that can be forced to 15 tons, is in place. This annex also houses the sand-mixing room, coreroom, core ovens and a flask carpenter shop. This arrangement leaves the entire floor space of the foundry proper available for actual molding. The central and right-hand bay are intended for heavy work and are each traversed by two cranes of 20 and 30 tons capacity. The floors are filled in with molding sand. The third or left-hand bay is intended for lighter, machine and snap-flask molding; it is served by two 10-ton electric cranes. There are also provided six 2-ton electric-hoist swing cranes that can be attached to any of the main crane columns. For changing one of these cranes from one column to another not more than four minutes time is required; they are especially useful in rolling over heavy flasks and for placing large cores, etc., while leaving the main crane to its more legitimate work of transporting loads

FIG. 23. VIEW IN FOUNDRY.

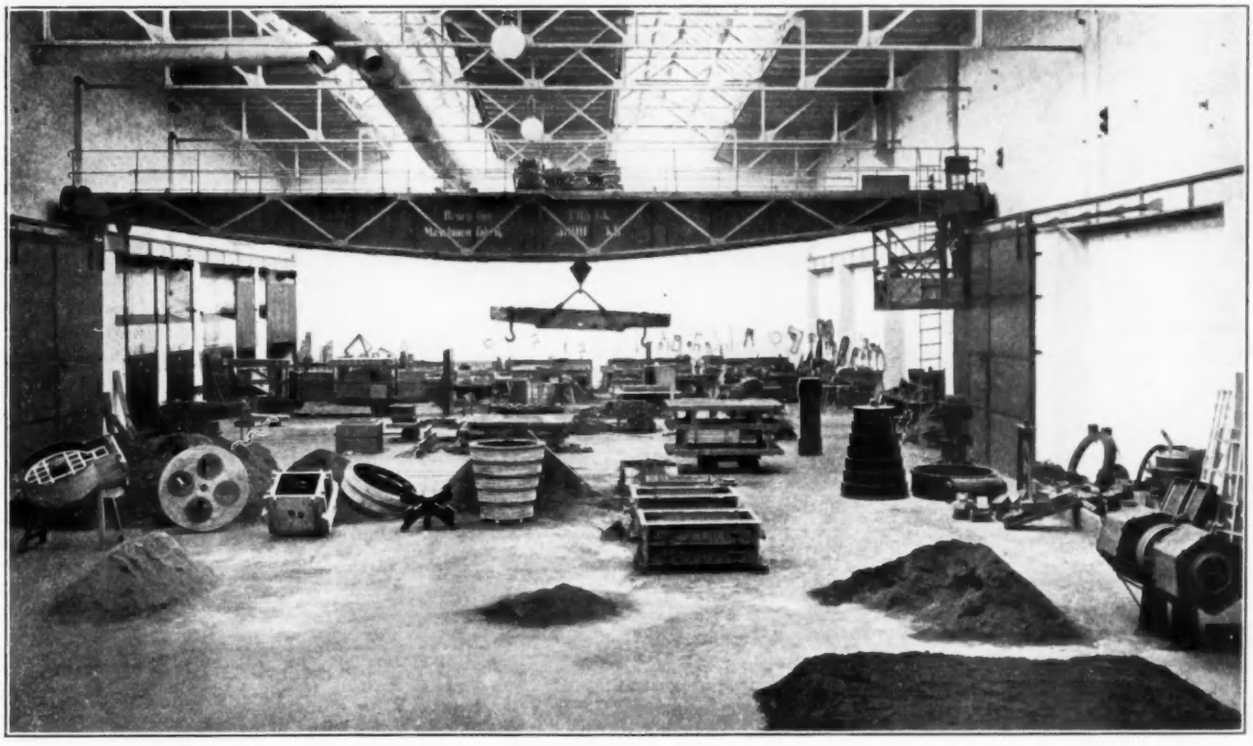


FIG. 24. VIEW IN COREROOM.

from place to place. At the lower foundry end a track runs across all these bays and serves to carry ladles on special trucks from bay to bay. A similar short track in front of the small cupola allows a large gathering ladle to be run aside when filling a smaller one. A short section of removable track is laid from the small cupola to the other bays, for conveniently carrying heavy ladles across when the large cupola is not in use. The small cupola also is served by a track scale, electric elevator, and large charging floor similar to those described in connection with the large one. Mixing and core sand also are carried up this elevator to an intermediate story and run into the end of the core room, to be dumped into proper bins. From these bins the sand is taken at the ground level as required to a mixing machine. Fig. 24 shows the core room as seen by the visitor standing above the sand bins. It is served by a 5-ton traveling crane and by two sections of narrow-gage track running across it to the foundry. Most of the core work is done at the upper end, where the entrances to five commodious core ovens form the left-hand wall. These ovens are fired with briquets from the opposite end. A temperature of 150 degrees Cent., with a variation of not more than 5 degrees Cent. for any part of the oven, is easily maintained.

Adjoining the core ovens is a small carpenter shop. As the flask storage yard is just beyond this shop, it is very conveniently placed for repairing flasks without interrupting their direct line of transit from yard to foundry across the core-room. A specially devised system of core-oven trucks with removable planed platens permits making up heavy cores on the platens and of drying and carrying them to their ultimate place on the molding floor without rehandling.

Leaving this department, we re-enter the foundry near its upper end, and find that it is screened from the clearing room by a structural steel frame work filled in with brick to a hight just permitting the crane basket to clear. In the center of each aisle is a double sliding door of the same hight as the brick wall. Counterbalanced lifting screens serve to close the space between the tops of the walls and the light wire cement partitions reaching from the roof to the lower stringer of the roof trusses. Swinging doors attached to these elevating screens are constrained to automatically close as the screens rise, by engagement of a roller with a fixed spiral cam slot. This arrangement can be made out at the upper end of Fig. 22. So far as we are aware, this is the first time that a foundry and machine shop have been arranged in one line, under the same roof, with a continuous crane track allowing the carriage of heavy work directly from the foundry to the machine shop and machines without rehandling. It was considered wise to provide for a complete shutting off of the foundry from the shop by a double set of movable partitions as described, in order to prevent the passage of foundry gas, smoke and dust into the machine shop. It has been found, however, that the natural draft through the louvres at the apex of the roof is sufficient to prevent all trouble from that score; what little of vapor curled around the partition of the first roof truss was quite carried off before getting to the lower edge of the second roof truss partition.

Smaller hinged doors in the sliding ones serve as a passage when the latter are closed. Through one of these we come into the casting clearing room with its trumbling barrels, emery stand and closed sand blast cleaning machine at one side.

Crossing this brings us into the casting storage room, which is of moderate dimensions, as it is intended to store parts close to the machines that are to operate on them; partly to avoid rehandling and partly to relieve the men of any worries as to the existence of a job to follow the one in hand. Plenty of space has been left around the various machines to permit this. To the left of the storeroom is housed one of the Buffalo Forge Company's air heating coils and fan and a 150 horse-power two-stage compressor, delivering air at 90 pounds per square inch for the service of the "steam" hammers in the blacksmith shop, as well as to the various hoists and pneumatic tools, through a system of pipes covering practically the entire plant.

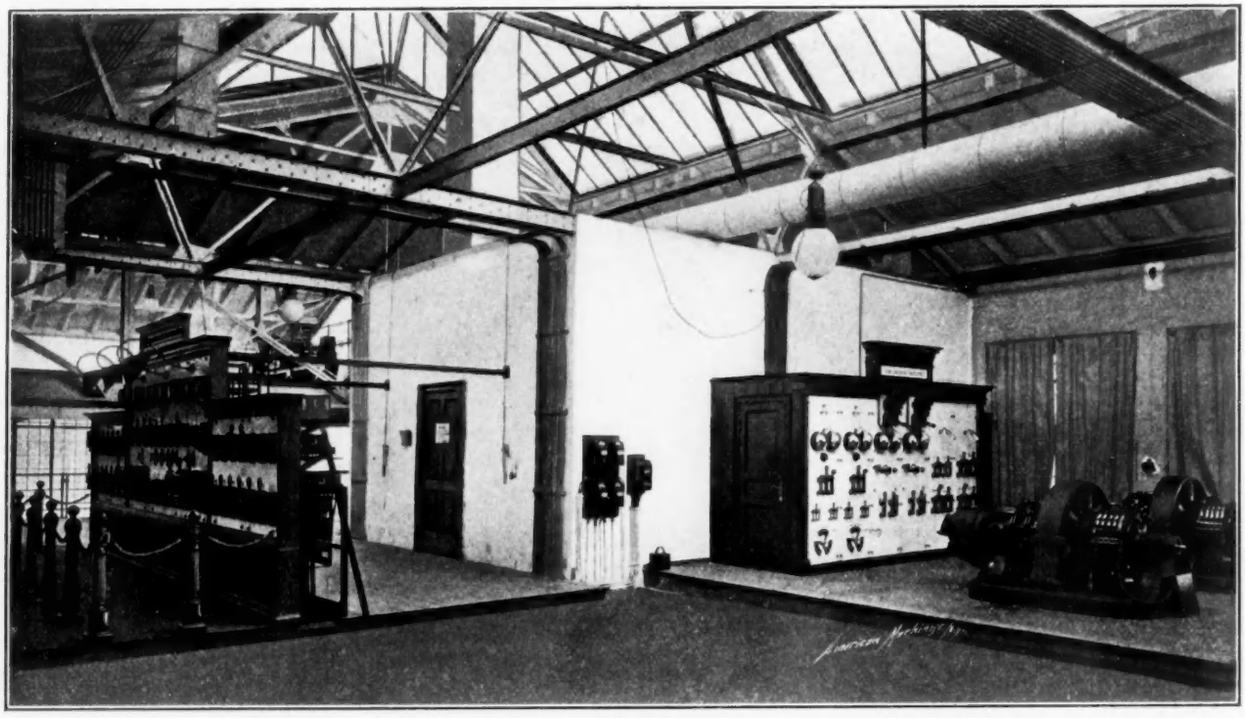


FIG. 25. POWER PLANT.

HEATING SYSTEM.

Traversing the length of the storage room, a glance aloft reveals two more sets of heating coils with their attendant fans in the roof trusses of the center aisle; at the farther end a door gives into a small, two-storied annex devoted to the uses of the foundry office and test room, and to the accommodation of a fourth hot air heating unit.

Passing through this we reach the yard, in the rear of a small boiler-house containing two boilers of Cornwall type. Sub-

terranean passages from this to the various buildings on the opposite side of the shop street permit ready access to the steam pipes leading to the latter. Unlike the main shops, all of the others are heated by direct radiation from lines running along the walls. High-pressure steam is used in a modified direct return steam loop system, that has so far been found to work with remarkable freedom from water hammer.

THE MACHINE SHOPS.

A sliding door permits trucks from the blacksmith shop directly opposite to be rolled into the machine shop and is also utilized by the visitor, who at once finds himself in the first of two aisles devoted to such machines as medium-weight lathes, drills and small boring mills that are made up in lots and for stock. In the first aisle are the various machine tools, with a milling and gear cutting department—the latter serving also the rest of the shop, while the second is reserved for erection.

The floors are all of creosoted rectangular wooden blocks, set with the grain up on a carefully smoothed and leveled concrete floor varying in thickness from 6 to 12 inches. The lighter machines are set on small brick piers of the same hight as the wood blocks removed to make room for them. This type of flooring is found to answer admirably, being decidedly superior to the best laid hardwood planking for heavy work. The removal of a damaged block is a very simple matter, as is also the taking up of a whole line to accommodate the insertion of an electric wire; while slivering is a thing unknown.

A staircase at the lower end carries us up to a second story, or rather gallery, the full width of this aisle; the rear end is devoted to the making of tools for the manufacturing department below. At the lower end this gallery is continued along the wall, terminating the second aisle as a narrow platform on to which a 10-ton traveler can deliver machines or heavy work. A glassed-in enclosure, built against a partition dividing this room from the next, serves the foreman and his clerk, while a toolroom with counter and wire screen adjoins it.

THE POWER PLANT.

Passing through the partition, we enter all of the power station that the plant boasts (Fig. 25). It will be seen to consist of a series of transformers housed in a special fireproof compartment; they receive alternating current of 10,000 volts from a public station of 50,000 horsepower and give it out to the large distributing board in front at 225 volts pressure to serve the various motors and incandescent lamps. The second smaller switchboard is devoted to the service of the cranes, which all have continuous current motors wound for 220 volts; two motor transformers required for this work are to be seen just in front of the small switchboard. The gallery is carried slightly beyond the junction of this aisle with the transverse erecting aisle at its upper end, so that the cranes traversing the latter may deliver machinery to it.

(*To be concluded next week.*)

The Paris Exposition—XXI.

A NOVEL FRENCH MILLER.

In the series of articles, of which this is the last, the object has been to give an account of all the machine tools shown at Paris that could be said to exhibit new features of special interest. As previously explained, however, this requires the cooperation to a greater or less extent of the builders of the machines, and it has not been possible in every instance to secure this. In most cases it has been necessary to ask the builder to supply at least some information and usually also a photograph from which we could make a suitable engraving; such photographs as could be obtained in the exhibition being generally worthless for any serious purpose. As the articles have shown, very many exhibitors have readily given such assistance as was necessary, but others have given only promises of such assistance, while one or two have refused it. Some of the machines exhibited by these people are nevertheless of such a character that we must give them some attention, and I therefore attempt it with such material as is available, consisting for the most part of circulars or catalogs obtained at the various exposition spaces in which the machines were shown—all of them in the French language.

In the space occupied by Pretot, 42 Ave. Philippe-Auguste, Paris, I saw the machine shown by Fig. 188, together with a number of other milling machines larger and smaller, but all of them possessing the distinctive features which characterize this one. In charge of the space was a representative of the builder, who said he was an engineer and who evidently understood the machine well enough, but knew nothing of English, and so we were compelled to get along as best we could with my lame and impotent French. He said the machine was not new in design, but had been built substantially as shown for about ten years. He promised that he would see that a photograph of it was sent to the address I gave him for use in showing the machine in the "American Machinist," and assured me with characteristic French politeness that he understood me perfectly and would see that the material I wished was promptly sent. I have never received it, and so am under the necessity of reproducing the wood cut in the circular which he gave me in order to give an idea of what the machine is like. By this it will be seen that it is very

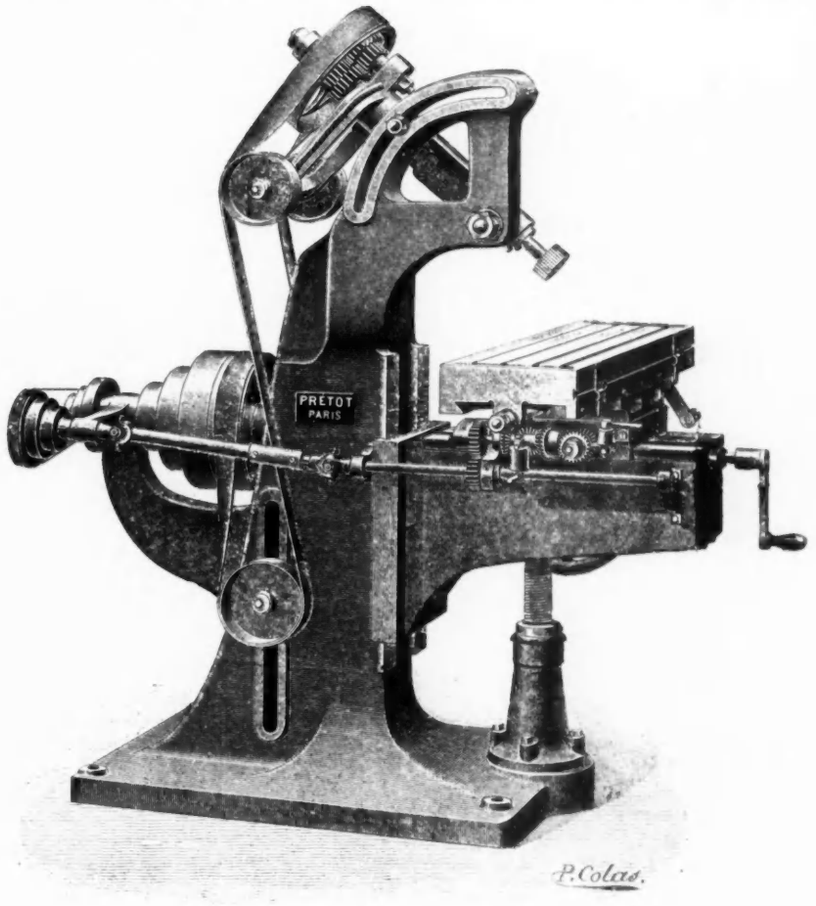


FIG. 188. A FRENCH UNIVERSAL MILLER.

like other machines of the knee-and-column type, except that the spindle is so mounted that it, with its boxes, can be set at any angle, from the horizontal to the vertical, and this of course enables many cuts to be taken with plain cutters that would require angular ones with the ordinary machines. The machine has also the swiveling motion for the table, and the maker in his circular says: "Milling machines constructed up to the present time are generally either horizontal or vertical and it is noticeable that with these machines it is absolutely impossible to complete a piece of milling work without many successive mountings of the piece upon the table; which occasions a great loss of time, besides interfering with the accuracy of the work. For avoiding this

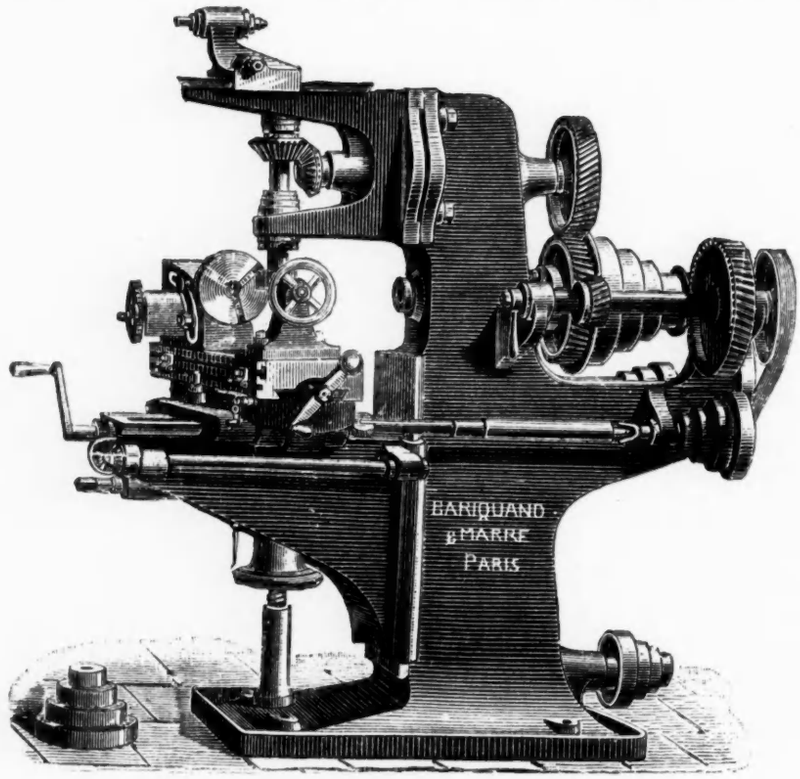


FIG. 189. A FRENCH UNIVERSAL MILLER.

we have invented a type of machine which may really be called 'universal,' since it will mill either horizontal, vertical or at any angle."

The method of driving the spindle by the belt which runs over the two guide pulleys at the top and the two weighted pulleys at the bottom will be clear from the engraving, and it will be noticed also, I suppose, that there is one feature of the machine which is always avoided here, *i. e.*, if anything happens to the spindle drive—if the belt slips a little or comes off the pulleys—the feed keeps on at its regular rate until something gives way. Our practice here is based on the belief that if anything happens to retard or stop the motion of the spindle or the cutter, the feed should be correspondingly retarded or stopped. Nevertheless, the machine is certainly an interesting one.

Although the cut does not show them, the machine is supplied with centers, one of which can be driven by gears from the feed motion, so that spirals can be cut, and there is also an attachment which goes on in place of the sleeve and spindle, and which is a shaft having a crank disk with connection to a ram, by means of which slotting, *i. e.*, vertical planing, may be done.

THE BARIQUAND MILLER.

The most prominent tool-building establishment in France is that of Bariquand et Marre, of Paris. If a piece of really fine tool work is to be done in France, it is pretty sure to be done in this establishment. They make a great many milling machines, and they also make fine measuring instruments, standard gages, etc. If they have any home competition in this class of work, it is so unimportant as to be practically undiscoverable. In fact, it is said that the only competition they feel at all is that of a few American firms. I asked these people for some photographs of a few typical machines of theirs that were in the exhibition, and told them I wished to make use of these photographs in introducing the machines to the readers of the "American Machinist." They did not reply to my first letter at all, and to my second one they replied that they did not care to take advantage of my offer. As of course my offer did not involve any expense to them (as I was careful to explain), I am at a loss to account for their attitude; I do not know whether they do not approve of the "American Machinist" or whether they do not care to have their tools known to its readers. But the man in charge of their space gave me one of their catalogs, and from it I select two machines which will serve to show the style of their work. They are a universal milling machine, shown at Fig. 189, and a lathe, shown at Fig. 190. We have all heard a great deal of that artistic touch which is sure to be given to everything French. An article of French manufacture may, we are told, be sometimes deficient in other respects, but there is sure to be that gracefulness of outline and beauty of form associated with all products of French workmen, and which it is well nigh impossible to attain anywhere else in the world. These two engravings of machines by the best known tool builders of France will give an idea of how this artistic touch is carried out in machine tool design. Perhaps if I had been favored with the photographs asked for, we could have given a better idea of it, because, as will be readily seen, the wood cuts are hardly of the best quality. We have reproduced them as faithfully as possible from the catalog.

The principal features of the milling machine will be readily understandable from the engraving. The catalog states that a great variety of work can be done upon the machine, either cylindrical, conical or helicoidal, and including many shop tools. The spindles have conical bearings, which are hardened and ground. The platen swings in either direction to an angle of 45 degrees, and there are automatic feeds with adjustable automatic stops. It will be noticed that the inevitable helical teeth are used in the back gears, that both the large gear and the pinion on the back-gear sleeve have about the same angle of helix, and that one is right-handed and the other left, with the idea, probably, of doing away with the end-wise thrust; though by making them thus, the end-wise thrust of the one is really added to that of the other, instead of their being balanced.

A variety of these machines of the same general type were shown, not all of them having the same kind of overhanging arm nor the vertical spindle. Where there is no vertical spindle the overhanging arm is fixed, but is attached to what appears to be the same frame, and in the same manner.

THE BARIQUAND LATHE.

The lathe shown by Fig. 190 is called in the catalog "Tour Universel de precision a 2 vis." It is more universal than we are in the habit of making lathes, because in addition to the ordinary functions it will divide work placed on the centers and there are various attachments by means of which it will do almost anything —mill, cut gears, etc. As to its precision, I have no doubt it is very refined in that respect. The spindle is of steel with hard-

ened and ground journals running in hardened and ground boxes and the two screws are both inside the bed, one to be used for ordinary feeding, while the other is reserved for cutting screws which are required to be particularly accurate. The lathe shown will take one meter, or 39 inches, between centers and its "Hauteur de pointes" is given as 160 millimeters, which means that it is about what we would call a 13-inch lathe. If you want to move the carriage upon the bed you must turn the wheel at the side of the bed under the headstock, but this is done only when there is a considerable movement to be made, all the smaller movements of the tool in line with the centers being effected by means of the upper slide of the compound rest. The rod which runs along the front of the bed is for the automatic stop of the feed. There is a hole through the arbor about ¾ inch diameter.

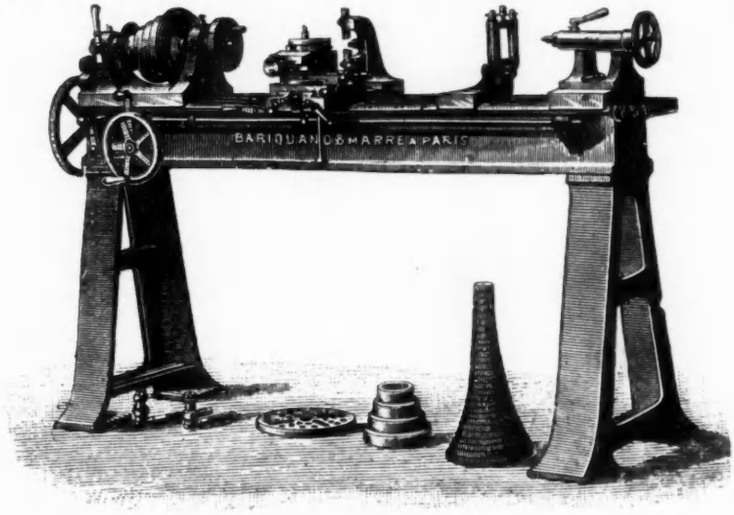


FIG. 190. A FRENCH PRECISION LATHE.

Bariquand et Marre exhibited a number of other interesting machines, but these will, I hope, suffice to give an idea of how their tools look. If I had been favored with some photographs, we could have given a much better idea, but for obvious reasons it is not desirable to put too many of these reproductions of French catalog wood cuts into the "American Machinist."

A NEW PLANER.

A planer which was shown in rather an obscure place on the Champ de Mars, and which I was promised photographs and blueprints of by the representative of its builders, but never received them, is shown by Fig. 191. I know only the Paris address of its builders, which is Kirchner & Co., 77, Rue Manin, but the planer is built somewhere in Germany. Outwardly it seems to have little of novelty about it, but as a matter of fact it has one feature that is quite a radical departure from established practice, and that is in the employment of a steel cable instead of a rack for driving the platen, the cable being attached to the platen at each end and passing over a double sheave driven by the gearing, something after the manner shown by the sketch, Fig. 192, in which *A* represents the double sheave, which is driven by means of a pinion engaging with teeth cut in the middle of its face and which takes the place of the bull wheel ordinarily used. Each bight of the cable passes once around the sheave, as shown, and the proper tension can be maintained by adjusting the screw passing through the downwardly projecting lug on the end of the platen, as seen in Fig. 191. This screw is attached to the tightening pulley *B*, Fig. 192. The two ends of the cable are permanently attached to the platen at the other end by suitable clamps, and I am assured by an engineer who has tried one of these planers in the shops of its builders that the drive is amply strong for any cut that can be carried by the machine and that it is also absolutely smooth and quiet. The makers, in a circular which I have, claim that other builders of planers attempt to avoid the formation of the gear-tooth marks which appear on work done upon a worn planer by making the beds very heavy, but that by this new construction this excessive weight of the platen which is so hard upon the guides and which prevents the platen from being handled rapidly is avoided. This claim will scarcely be given much weight by those who have read what has been published in these columns regarding the parts of planers that absorb power when the reverse takes place, but the makers of the Kirchner planer claim that, owing to this and to the fact that they can change the cutting speed of the planer at any time while it is working, this planer will produce 25 per cent. more work than the planers of the leading American builders which are at work in their own shops. The general style of the machine will be recognized as American. I do not remember just what the third belt-shipper is for, but it is probably because they have divided the working belt into two, so that it may be shifted more readily. The change of speed spoken of is effected by means of friction gear of some kind, I think, applied to the countershaft. The principal business of the builders of the planer is wood-working machinery, of which they had quite an exhibit at Paris, and they state in their circular that this new planer is based upon their "long experience and profound knowledge of American, German and English planers" and that they have applied to this all the practical and modern perfections of construction.

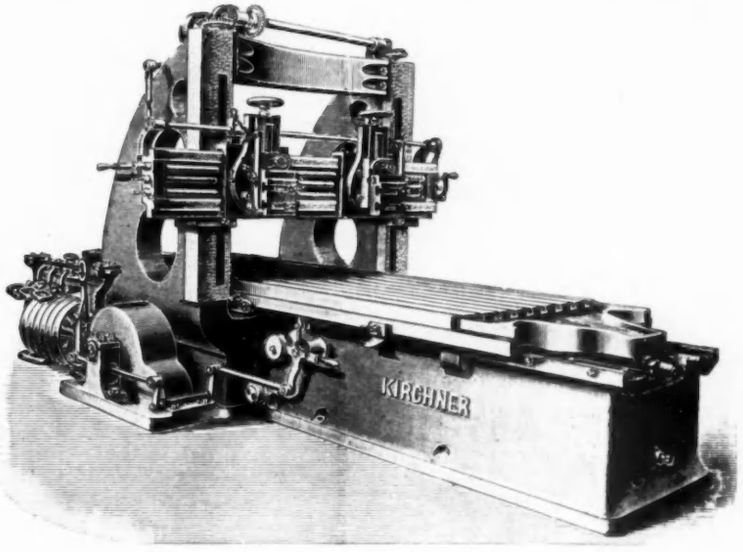


FIG. 191. A NEW PLANER.

Other machines that have not been mentioned in these articles were shown at Paris, some of them so important that no machine-tool exhibit could be said to be at all complete without them, but which possessed no features of novelty not already familiar to our readers. Among these may be mentioned the Jones & Lamson flat turret lathe, the Gisholt machines and

the Fellows gear shaper. The first named of these, especially, and the second to some extent, were represented also by many imitations, more or less exact, constructed in European workshops. In the space of one French builder I saw a machine which was evidently as precise an imitation of the Jones & Lamson lathe as could be constructed. It seems to me that machines of this character ought to be excluded from a great exhibition. Not because they do the builder of the original machine any particular harm—for I do not believe that they do—but because an exhibition of machine tools is supposed to be an exhibit of skill in design and in the working out of ideas in steel and iron. But what

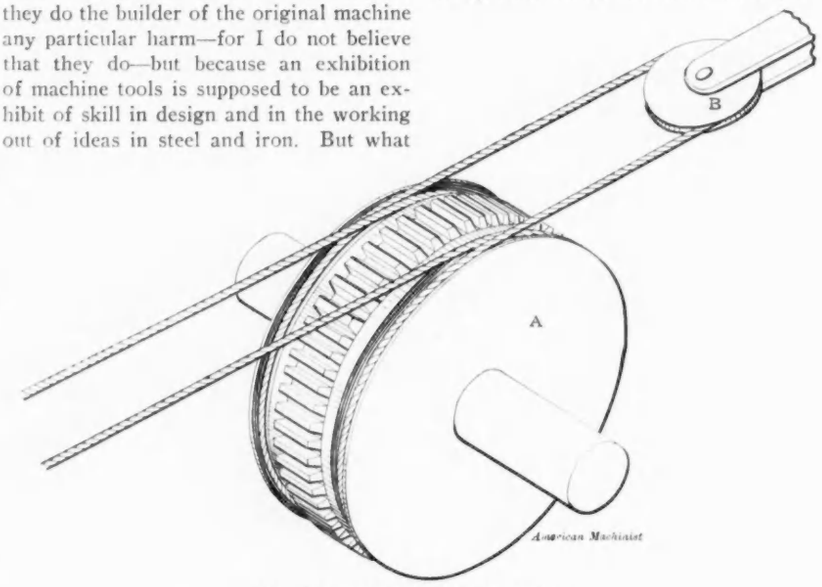


FIG. 192. DRIVING GEAR OF PLANER.

does the exhibitor of an exactly copied machine exhibit, except the fact that he has hired men who can turn and plane and file metal? And is there anything new or novel in that? F. J. M.

Turning Torpedo-Boat Crank-Shafts.

Editor American Machinist:

To turn a large crank-shaft is not a very easy job, especially if not fitted up for it. Take, for instance, a crank-shaft for the triple-expansion engine of a torpedo boat. These crank-shafts are required to be as light as possible, are usually made hollow, and besides this there are the thrust collars on the after end, as shown in Fig. 1. This when forged in one piece makes a rather springy job of it in turning.

It was my practice to mount the forgings on the lathe centers and first rough down the main bearings, eccentric fits, thrust collars and the coupling on the after end, also facing in on the outside of the webs. This being done, the stock inside the pins was cut out. A row of holes was drilled next the pin, slots were cut, as indicated by dotted lines in Fig. 2, and the section marked *A* was removed.

Now being ready to rough down the pins and the insides of the webs, two cast-iron disks, Fig. 3, were bored to fit the ends of the shafts. A circle was scribed on the disks corresponding to the throw of the crank and three equidistant points were located. Holes were drilled and reamed at these points and into these were pressed hardened plugs which contained the centers. Grooves should always be cut in these centers to allow oiling without slacking the tail center.

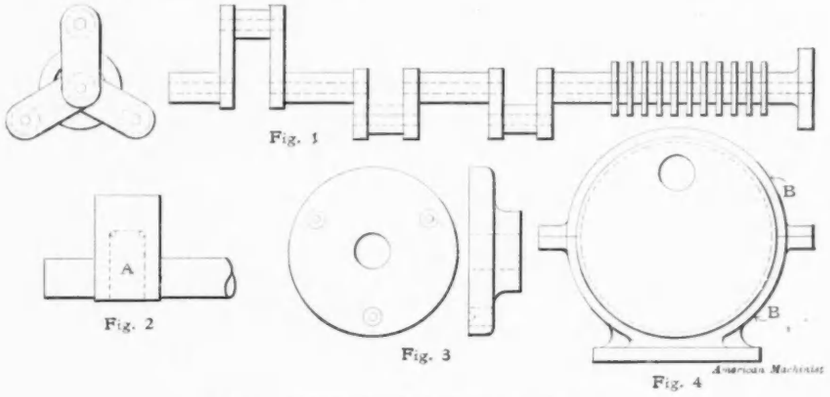
To locate the disks the shaft was laid in V-blocks on a planer platen, two bearings being roughed to the same size to rest in these blocks. The center of one pin being determined, the disks were put on so that one of the centers of each would correspond. It is well when thus locating one center to go over the other two pins to make sure that they will come so that there will be stock enough to round them up. If those do not show up just right, it might be possible to change the center of the first pin enough to accommodate them. While the shaft is resting in the V-blocks, jacks to take the thrust of the centers should be put in the gaps of the cranks. These jacks should be put in without strain and should be made so as to keep the gap from either closing or opening.

The shaft now being put in the lathe on one pair of these pin centers will, of course, be greatly out of balance; in fact, the weight will be all on one side, except one-half of the pin that is being turned. Weights are bolted on the face-plate to make the lathe run smoothly. This, however, does not help the crank-shaft much. To do this the weights should of course have been put on the crank-shaft itself. This could not well be done, but a center rest was made, as shown in Fig. 4. The inner or rotating part is an eccentric the throw of which at the center of the hole is the same as that of the crank. It is loosely clamped on to one of the bearings or eccentric fits of the shaft and rolled around until the center of it comes in line with the lathe centers. In this position the outside runs true in the bearing *B*, which rests on a parallel piece across the lathe end, the whole being clamped down as usual with center rests.

The rest shown gave good satisfaction, as it allowed heavy cuts to be taken. There is usually a large surplus of stock to get rid of on this class of forgings, the pins, being square in section before trimming, measure across the corners nearly twice the diameter of the finished pin.

In roughing the inner sides of the webs, two tools were held in a T-shaped holder and both sides were thus operated on at once. The first pin being roughed, the jacks were removed and carefully put back again. The rest was unclamped and the job was rolled around to the next set of centers; then, the eccentric being trued up and the strap slipped over it and clamped, we proceed as before.

After the pins were all roughed down, the shaft was put on the planer and the webs were planed to the proper width. The dovetails also were cut to receive the balance weights that go with the finished shaft.



TURNING A TORPEDO-BOAT CRANK SHAFT.

The hole through the shaft was next bored, or, rather, was enlarged, as it had been drilled previous to this, as were also the holes through the pins. This was done so that the oil tempering and annealing processes would have proper effect on the metal. In boring the hole through the shaft a common bull-nozed boring bit was used. Two ends were taken, one en-

larging the hole from 2 to 2¾ inches and the next to 3 inches. This amount of stock could of course have been easily taken at once, but it was found that upon taking one cut through, and removing the scale in the hole, the shaft would spring, and thus the hole would be out when the shaft was finished. The second cut was therefore taken, which straightened up the hole without springing the shaft any more.

At this stage the forging has been roughed all over (except the holes through the pins, which can be bored to finished size at any time), the idea being to rough down all the parts and to relieve all the strains in the outside surplus metal due to the forging process before any part was finished.

I found that in finishing the best results were obtained by finishing the pins first. To finish the pins I proceed much the same as in roughing. As the shaft is now more or less out of truth (as noted when boring the central hole), it will be necessary to turn off a place for the steady-rest to go on. The eccentric will of course require a bushing; a good plan is to provide two bushings, one ¼ inch smaller inside than the other, the outside of both being the same, using the large one when roughing, and turning the shaft to fit the small one when the eccentric is used for finishing.

The shafts made by this method were satisfactory in every way, were true, and came up to all the requirements.

NICK L. STEEL.

Universal Grinding Machine.

The accompanying illustrations show the universal grinding machine made by the Universal Machine Company, of Providence, R. I. Figs. 1 and 2 give front and rear views of the No. 1 size, and the other views relate to details.

An interesting feature is the wheel head, shown in section in Fig. 3. It will be seen that the wheel may be mounted between the bearings or be overhung as desired. To facilitate changing wheels, the bearing binder caps *a b* are hinged and the center of the middle wheel has a sufficiently large hole to pass over the bearing shell. The cap *c* for excluding emery dust from the right-hand bearing will be noticed, and a similar cap is applied to the left-hand end when the outer wheel is not in use. The most interesting feature of this head is, however, the manner in which the bearings are made self-compensating for temperature. The bearings are conical, the cones opposing one another. The effect of the increased diameter of the spindle due to heat is to tighten the bearings, but the effect of the increased length is to loosen them, and the angle of the cones has been determined by experiment to be such that these two effects shall neutralize one another and result in bearings which are equally tight warm or cold.

The internal grinding fixture is shown in Fig. 4, and in section in Fig. 5. The pulley spindle runs in ball bearings. The emery wheel spindle is carried by a sleeve *a*, Fig. 5, and is separate from the pulley spindle, being driven by the latter as shown. The sleeve *a* is held by a split grip, and to change the wheels it is only necessary to loosen this grip, as the grinding and wheel spindles readily separate. Another feature of the arrangement is that the pressure of the wheel against the work is not felt by the pulley spindle bearings, nor can slight lack of alinement between the three bearings due to spring of the supporting sleeve have a deleterious effect.

The water tank and pump are shown in Fig. 6. The pump is a simple contrifugal which is always immersed, and hence needs no priming. Being vertical no stuffing box is required, and the bearings are raised well out of the water. The dirty water from the machine first flows into the precipitating pan *a*, from which it overflows under curved lips *b b*, so formed as to act as skimmers and hold back the floating scum. At the same time most of the heavier particles settle to the bottom and comparatively clean water only goes to the tank. The precipitating pan may be lifted out at any time to be cleaned or to give access to the tank for cleaning. By loosening the clips *c d* the pump may be bodily removed. When changing the water in the tank, the location of the pump is such as to pump out most of it, and the remaining water and sediment are readily removed by taking out the pipe plug *e*—the location of which is such that a pail may be placed under it.

Particular attention has been given to

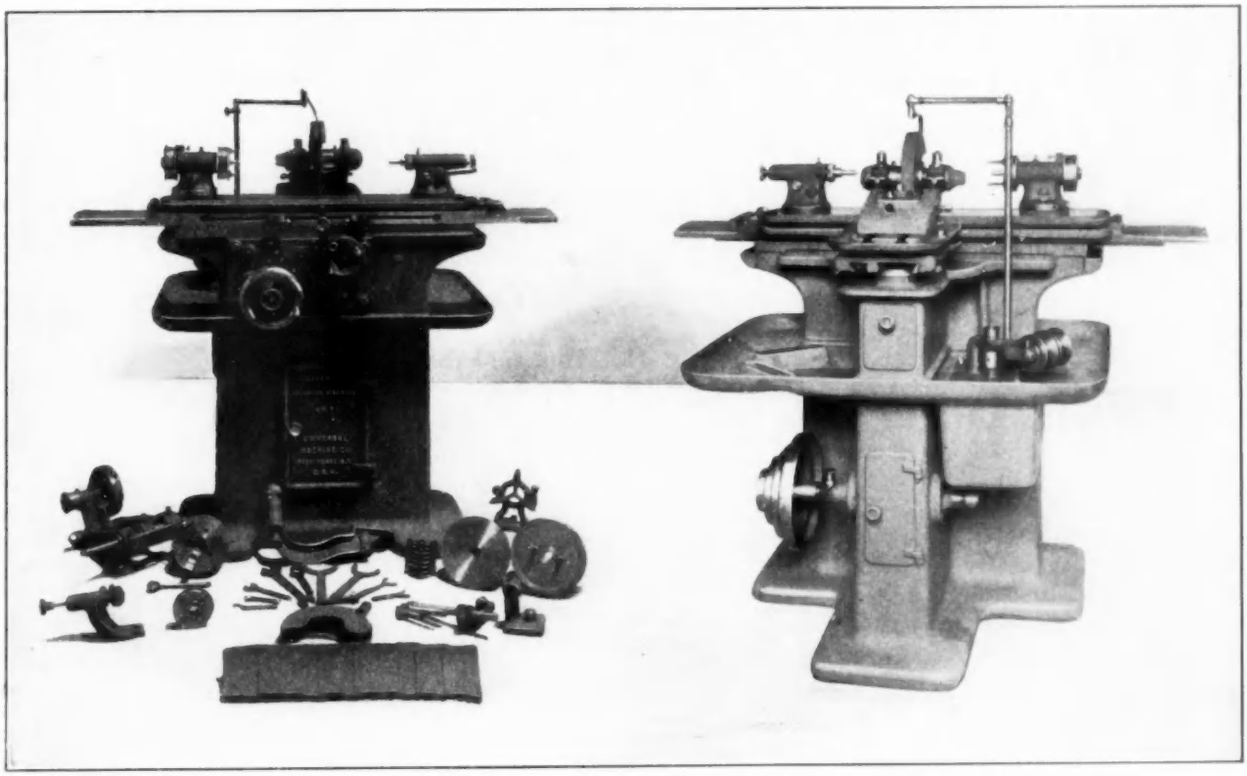


FIG. 1. FIG. 2.

FRONT AND REAR VIEWS OF UNIVERSAL GRINDING MACHINE.

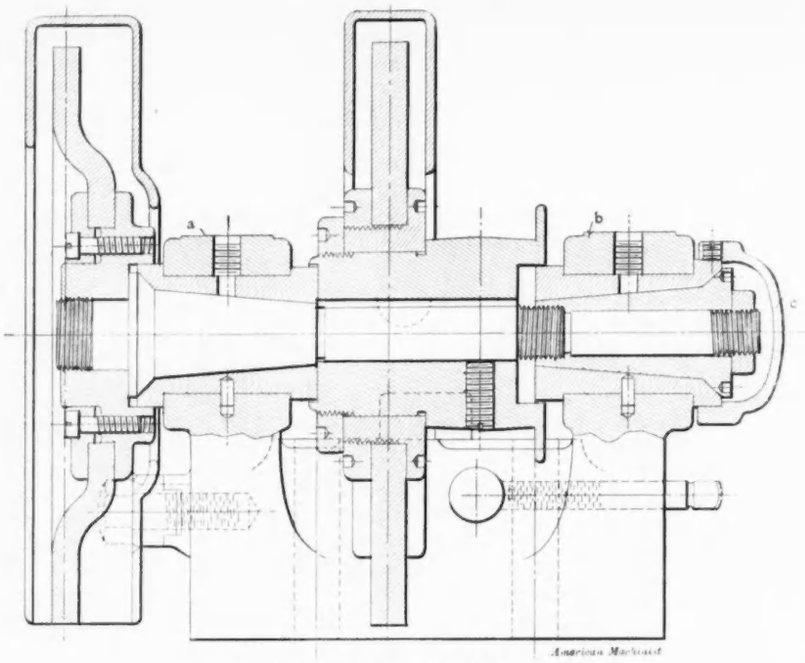


FIG. 3. EMERY WHEEL HEAD.

the reversing gear of the table in order to secure positive and accurate reversal. The mechanism is shown in Figs. 7 and 8, the former being a photographic view of the rear side of the apron, and the latter a drawing of the leading parts.

The traverse of the table is by the worm shown at the right of the shaft in the foreground of Fig. 7, which, when in position, lies in the bearings *a b*. This shaft and worm are driven from one or other of the small belt pulleys *c d*, which in turn are driven from within the bed by pulleys on the shaft of the cone pulley shown at the left and below on Fig. 2. One of the pulleys *c d* is driven by an open and the other by a crossed belt. The reversal of the table traverse is effected by shipping the claw clutch *e* between the pulleys. The mechanism by which this reversal is effected shows plainly in Fig. 7, but its action can best be followed by reference to Fig. 8, in which *f* is the vertical lever of Fig. 1, which is operated by the trip dogs on the table.

The center of the worm shaft in this figure is at *g*, and *h i* are the pieces which enter the groove in the claw clutch and shift the same. Pieces *h i* are carried by a yoke *j*, which is supported by a working fit on the shaft *k*, to which lever *f* and fork *l* are keyed. In the position shown the parts are at the instant of reversal. Lever *f* has been pushed to the right by the trip dog, thereby swinging fork *l* to the left. Fork *l* carries spring-backed pins *m n*, and of these *n* has been made to bear against the end *o* of the yoke *j*. Immediately prior to the position of Fig. 8 this end *o* rested against pawl *p*, as seen in Fig. 7, but in Fig. 8 the movement has continued until wedge *g* carried by *l* has depressed pawl *p* by engagement with its pin *r*, thereby releasing *o*, and the pressure of the spring behind pin *n* is ready to throw *o* to the left, and thereby ship the clutch.

Letters from Practical Men

The Open Shop Door.

Editor American Machinist:

I always enjoy reading the short, pithy communications of Mr. Tecumseh Swift, although it is not always possible to agree with his remarks. It is about trade secrets I am now taking up the pen. Say that a workman writes you and sends illustrations of a way of doing a certain job, which way he did not invent, but was shown by his foreman. Now, does the master agree to the workman telling his competitors how to save a dollar in making, say, a lathe? I imagine the master giving you details of the slotting or other machine that he builds, because if you take his tip and adopt the improvement you save money—and he makes money out of you.

Take Brunner Mond & Co., the chemical manufacturers in this country, who, by patient skill and inventive genius, turn a certain residual into a marketable commodity; are they to throw open their doors and windows and call upon the whole world, like a cackling hen, to come and view their latest achievement? According to your correspondent, their money spent on the invention is to count for naught.

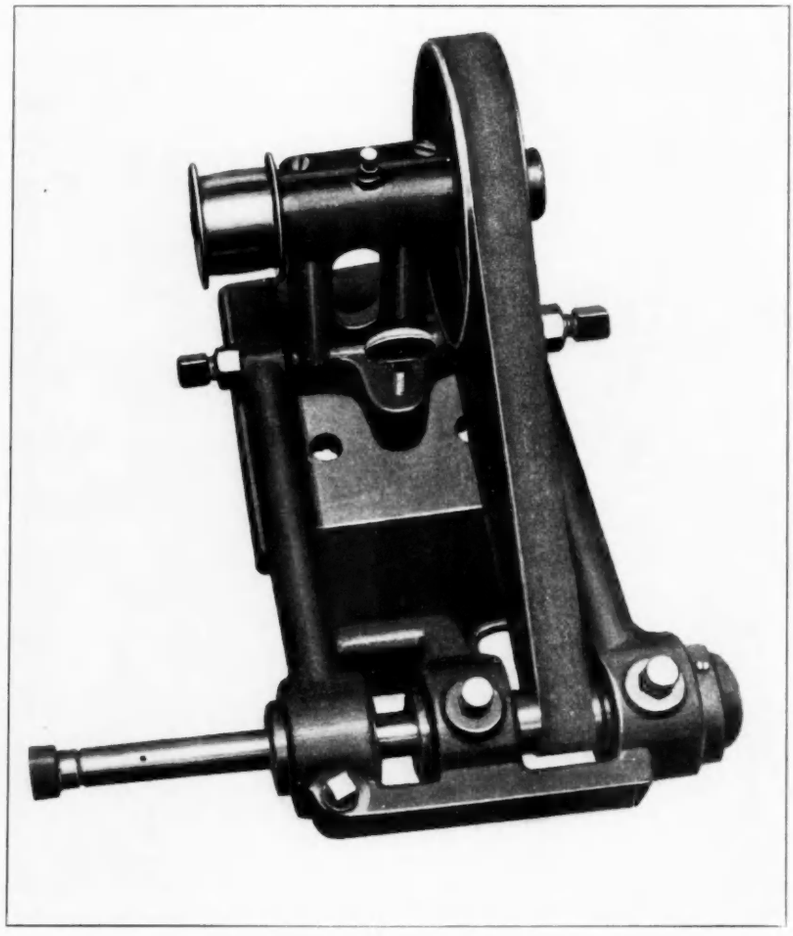


FIG. 4. INTERNAL GRINDING FIXTURE.

You say, where do the patent laws come in? They do not come in at all, because about the only thing you can successfully protect is the catchpenny toy that is sold by hawkers in Cheapside. According to Mr. Tecumseh Swift, by the time your competitor gets his copy at work you ought to have something better on the market, but if you can do this in America the speed you travel at must be more rapid than I assumed.

I do not advocate policing works, but there is a middle course which recommends itself to all desirous of the world's welfare, without putting a tax on brains.

ARCH. J. S. B. LITTLE.

Birmingham, England.

Editor American Machinist:

Ever since I was a "kid" fellows have been thinking they could lick me so much

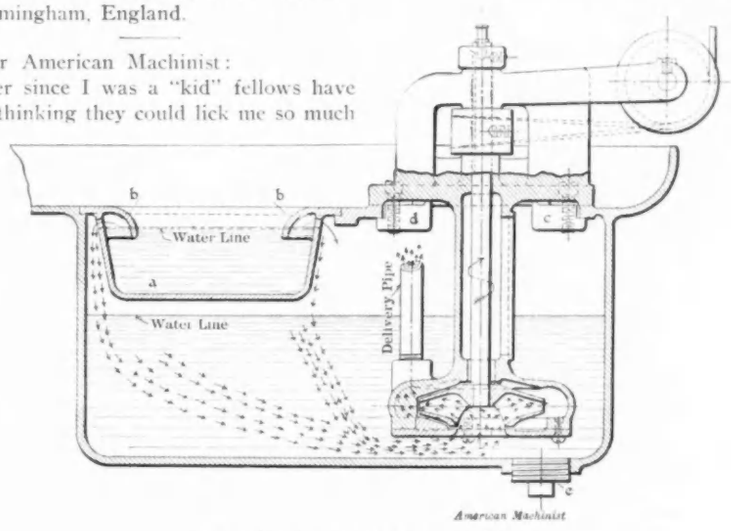


FIG. 6. WATER TANK AND PUMP.

better if they could get me off my own ground. The very interesting letter of Mr. Little, of Birmingham, which I have been kindly permitted to read in advance of its publication, is another of those attempts to argue with me by talking about something else. I talk usually very close to the shop where most of my working hours have been spent, the machine shop, foundry, blacksmith shop, pattern shop, boiler shop, and what goes with them. When I talk about something else there is usually no easily misunderstanding what I am about. When I speak about the open door of the machine shop in the United States I am not professing to know really whether chemical works have doors or not.

As a matter of fact, however, I can say that we have some doors in this country. I do not suppose there are any doors in England or in Germany more tightly closed than those of the Solvay Process Company, of Syracuse. I know another very large chemical works in Philadelphia with tight doors, and that may be the habit in that line of industry. I have somewhere in my possession a pass that was issued to me when it was necessary for me to be for a week or more inside the slaughter house or packing house of Armour & Co. at Kansas City, in connection with the installation of a special line of machinery. The pass which secured my admission to the works distinctly specified three departments which I was not to be allowed to enter. Here there was a door inside a door. There is a large concern

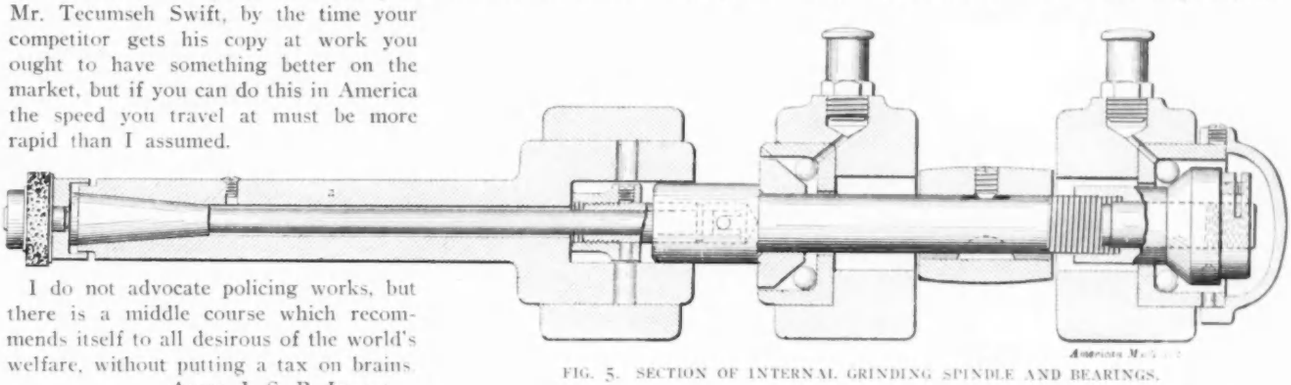


FIG. 5. SECTION OF INTERNAL GRINDING SPINDLE AND BEARINGS.

in Brooklyn which makes a specialty of manufacturing corrugated furnaces for steam boilers. If any fellow can get in to see how they make them he is sharper than I am.

So we are not ignorant of the use of doors; but, as I have said, those of our machine shops open easily. Mr. Little tells us he takes up his pen to write about trade secrets. Why, it is astonishingly near the truth to say that we have none. He asks: "Does the master agree to the workman telling his competitors how to save a dollar in making, say, a lathe?" Well, absurd as it may seem, the American shop proprietor doesn't wait for the workman to tell it; he tells it himself. Look back only two or three months in the pages of the "American Machinist," and there is a full and clear illustrated account of a new way of molding a bed for a grinder, so that the work on it is

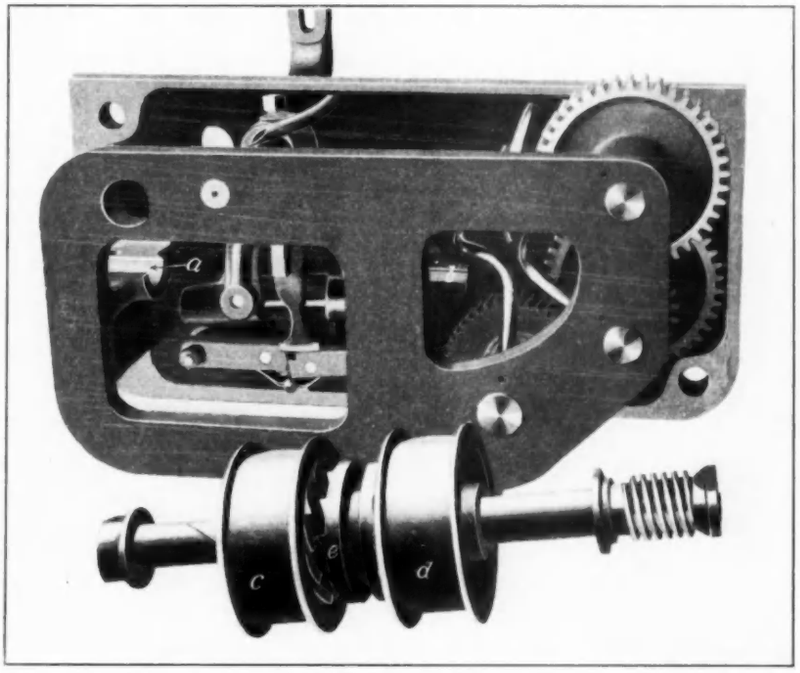


FIG. 7. TABLE REVERSING GEAR.

done in less than one-half the time and a better casting is produced than by the usual method of making such a piece. The Landis Company has several competitors who make similar castings, and there are a great many concerns who make castings to which the process would apply to their great advantage, but that does not deter them from letting it all be published.

I think it was about the middle of last year that the "American Machinist" told us that someone had written to inquire how the neat and handsome name-plates were cast upon the beds or frames of the machines made by the Brown & Sharpe Company. The "American Machinist" at once wrote Brown & Sharpe that someone, presumably a competitor, would like to know about the casting of their name-plates. "Why, certainly; we make them so and so, make the pattern with a print like this, set the cores in this way, etc. We send you a sample core, and if we have omitted anything, or if there is anything about it not understood, please let us know." All this, it will be remembered, was in the "American Machinist" at the time referred to, and there is much information of this character continually appearing in its pages.

As to the workmen's divulging shop secrets, I can tell how it has been with myself. I saw the inside of the shop, apprentice, journeyman, foreman and superintendent, every working day for just forty years. I knew during that time several shops in different lines of business. I never saw the day when I would not have felt entirely at liberty to tell anyone how anything was done. I never had an employer who would have considered it any breach of trust for me to have told the details of any operation of the shop. If we have trade secrets I have not had anything to do with them.

Of course Mr. Little's view is correct. The divulgence of any *one* "secret" would be a piece of foolishness, but as long as we all do it freely, the habit is all right. One advantage given will balance another advantage received, and so on all around. We not only thus mutually help each other, but we also raise the standard of our national efficiency as against the rest of the world. The telling of this thing as freely as I do is of a piece with the rest of it. Our mutual liberality of minute technical information is one of the things most impossible of exportation. No one in England, or in Europe anywhere, as far as I know, could begin the same liberal practice which we unthinkingly pursue without being the loser, and it is scarcely conceivable that all should together begin to cultivate the habit. The only way I see for our transatlantic friends is for them to go on in the old way, with their doors tightly shut and guarded and jealously keeping each new device from the knowledge of each competitor. I have, however, great confidence in our way for us. I have some fear that we may be gradually getting out of it as our establishments get larger, and as the necessity of doors for other purposes becomes more apparent. As long, however, as the "American Machinist" and the other leading trade papers keep telling us, as fully as they do now, the latest and best ways of doing things, and keep spurring us on by their statements of how much is done, we have in them a national industrial safeguard which perhaps is not even yet sufficiently appreciated. Those who have the privilege of frequently looking over the mechanical publications from both sides of the Atlantic cannot fail to notice the difference in them. I know more than one paper from the other side that costs more to make than any American paper, but after all they have not quite the same kind of stuff in them. They tell more than we do about things done; we tell more than they do about how things are done, and I must still think that more is learned of practical value on the other side from our papers than we learn from those that come to us.

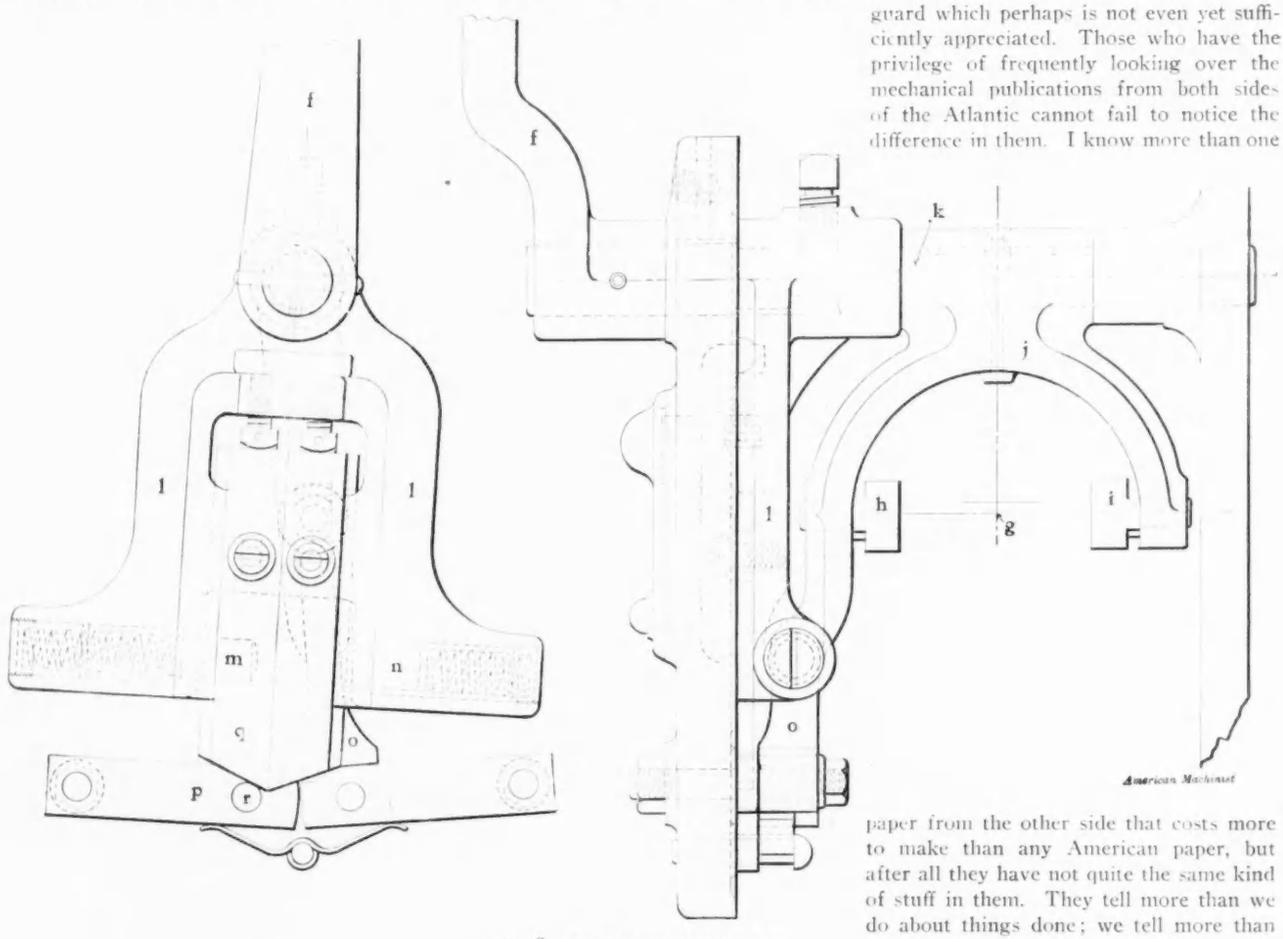


FIG. 8. TABLE REVERSING GEAR.

Mr. Little refers to the American patent system. That, like everything else, has been a cause or agency with more than one effect. The securing to certain inventors their property rights in their inventions is one thing; but another very great effect is that which has accrued from the publication of the patents. The knowledge of any valuable invention does not so often operate to stifle any inventor, or to deter him from infringement, as it does to stimulate and impel him to supersede it. Nothing is less likely to be final than a

valuable patent. One thing leads to another more surely in this line than in any other. Here, too, it has been with us, as in everything else, that the liberal distribution of information has been our greatest helper.

Now, our friend may take all this as merely another bit of our habitual boasting, but I certainly have not meant it that way. If the truth can be told straighter, I wish he would give me a lesson.

TECUMSEH SWIFT.

Some Points in Drawing Room Practice.

Editor American Machinist:

I have been very much interested in the series of articles on "Drawing-Room Practice" that have been appearing in the "American Machinist" during the past few weeks, and would like to give some of my vi ws on the subject.

Perhaps the subject that has been most discussed in this connection is the location of title. I think, with Mr. Danse, that by far the best place for it is in the lower right-hand corner. It is the handiest and most convenient for the draftsman, just as it is the natural position for the signature in a letter, and it is convenient for both side and end filing. When the tracings are put away in wide drawers, in opening the drawer the title is the first thing seen, and in the proper position to read, without standing sideways toward the drawer; and if filed in deep, narrow drawers, he can stand with his left side to the drawer. Personally, leaving out the undoubted economy in wall space, I have had just the same trouble as Mr. Danse in filing in deep, narrow drawers, and strongly prefer the other way whenever possible.

As to "Deke's" objection, that placing the title in the lower right-hand corner interferes with the arrangement of views, it is exceedingly seldom that a drawing fits the sheet so nicely as to leave no room for the title. In case this should occur, either use the next smaller scale, break out enough of the view to get the title in, or stand up the end view to the right of the plan, leaving the title space clear.

The contents of the title must necessarily vary with the individual needs of the drawing office, which will depend upon the nature of the output. Therefore but few rules can be laid down; but it should contain the firm name, the primary title, the descriptive title, date, scale, and also the name (or initials) of draftsman, tracer, checker and the head of the department.

Whenever a change, however slight, is made upon the tracing, there should be added a new date and the initials of either draftsman or checker, preferably the latter. If the work is done for outside parties, their name should appear in the title, after the firm name.

Each piece shown should be designated by a letter, which should be made large enough to attract the attention at the first glance. There should also be on the drawing a bill of material, so that the man who gets out the shop bills has only to copy this bill, and the shop bills are easily checked from it. It also enables each piece ordered on the shop bills to be at once located on the drawing, and *vice versa*. I enclose blueprint of a drawing bill.

Another great advantage in this system of noting is its convenience in referencing from one sheet to another. On the general drawing each piece shown is indicated by the detail sheet number and letter, thus: Piece A on sheet No. 1486 would be noted on the general drawing as 1486.A, etc., and the work of assembling the details is greatly simplified. It also makes it very easy to refer to a piece on pattern and stock cards, and to properly mark patterns and finished pieces. Another advantage is that it does away with a great deal of description on the drawing of the piece itself. For instance, on a globe valve or similar article, shown complete and figured, there is no more than enough room for the figures and lettering absolutely required; and when a name and description have to be attached to each piece the drawing becomes unduly crowded. But by simply marking the piece with a letter and putting the description, etc., in the sheet bill, the drawing itself is made very much plainer and the pieces are easier to check up.

Bill of Material

Letter	No. Wanted	Material	Finish	Name of Part	Use No.	Patt. Let'r
A	1	Cast Iron	All Over	Crank Disc		
B	1	" "	Where Marked	Spur Wheel	Old	Patt.
C	1	" "	" "	Spur Pinion	Old	Patt.
D	1	" "	" "	Pulley-Crown 24" x 3½"-1¾" Bore		
E	1	" "	" "	Pulley-Crown " " -Bushed		
F	1	" "		Air Chamber-Complete		
G	1	" "	Where Marked	Cylinder		
H	1	" "	" "	Crosshead and Plunger		

American Machinist

PART OF BILL OF MATERIAL.

I do not think it is good practice to section everything alike and then depend on the label to set it right. Not only does the label require more room than is available on a small piece, but the nature of the construction is not as quickly comprehended as it is when the sectioning shows the material of each piece. There need only be seven distinctive sectionings (cast iron, wrought iron, cast steel, forged steel, brass, lead or babbitt, and wood). These are standard in practically all the principal drawing rooms in this country, and they are very easily remembered. In case of a material not included in the above list, the draftsman can adopt a sectioning to suit himself and name the material in the sheet bill.

In my opinion the best and simplest system of indicating the sheet size is to write it as a fraction after the number. Thus the full sheet would be numbered 1296 and half, quarter and eighth sheets, respectively, 1297½, 1298¼ and 1299⅛.

I like to use stamps on drawings whenever possible. The bill heading and blanks up to "D" can be put on with a stamp, as can also the blanks for the job number and construction order, and the form "Drawn by," "Traced by," "Checked by," "Approved by." In a shop turning out a limited line of product, the use of stamps can be carried further, as shown in Mr. Sargent's article. By using an ordinary rubber stamp with opaque ink, such as supplied by several firms here and elsewhere, there is no need of a printing press. The stamps on the enclosed prints were put on the tracings with this ink. The suggestion to dust the impression with whiting is good, as this ink dries very slowly.

I agree with you in using a horizontal vinculum in writing fractions. The inclined vinculum is, as you say, much more apt to cause mistakes, and does not save enough space to make up. As for Mr. Danse's argument that a careless draftsman will get it wrong anyhow, I believe in using the system that is least liable to lead to error; and if you should happen to get a man who is going to get it wrong anyway, just fire him. A man who is that far gone is dangerous to have around, as he is dead certain to make blunders in things of more importance. "Deke's" suggestion, to omit the vinculum altogether is almost too radical for consideration. He does not seem to realize that without the vinculum the figures would have to be so carefully written that the draftsman would consume more time than he possibly could with either form of vinculum.

I think "Deke" also overdoes the thing by using inch measurements up to 8 feet. The reason for the old custom of figuring in inches only up to 2 feet was because the workmen used 2-foot rules, which

were numbered up to 24 inches. By having the drawings figured in inches up to 24, and then in multiples of 2 feet and intermediate inches—for instance, 3′ 20″, 6′ 18″, 0′ 23″—there was the least possible amount of mental arithmetic required on the part of the man in the shop. I have seen some very old drawings that were figured in this manner. Later the system came in of figuring in inches up to 24, as before, but giving every foot above that. This system is now in use in many establishments.

Of course, as machinists do not now use 2-foot rules, it would be more convenient for them if drawings were figured in feet and inches from 12 inches up; while the draftsman would be well pleased if he could work altogether in inches, as it would make "counting up" easier. This is only another case where a compromise must be made between the shop and the drawing room, and somewhere between a 24 and a 36-inch limit seems to be the best neutral ground.

In my opinion it is sheer foolishness to make draftsmen write "ft." and "in." in place of the customary ticks. They not only use up more time, but they crowd the drawing, and are an aggravation to every man in another establishment who has to use the drawings. Make the ticks plain; use a dash between feet and inch figures, with a "0" before the inches up to the first foot figure on bills of material, and check well. I think that the mistake mentioned in this connection in Mr. Danse's second article was more the checker's fault than that of the draftsman.

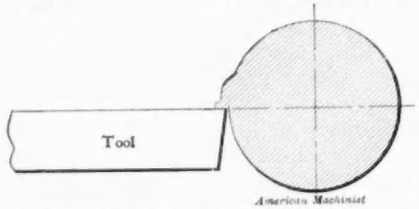
C. K. Hawkins.

The Water Anneal.

Editor American Machinist:

In your comment on the letter on the "Water Annealing of Tool Steel," on page 347, you state that it is generally conceded that the results secured by this process are very unreliable and not to be compared with the regular, although slower, process usually employed.

My experience of this process is that similar results cannot be obtained in any other way, and that the water anneal gives a certain texture or grain (I should not call it softness) totally different to that obtained by annealing in charcoal pack. Steel turned dry in the lathe after being water annealed has a peculiar dead-white appearance, like frosted silver, and the chips are very short and come off like little bristles, the full length of the cutting edge of the tool. This texture or grain more nearly resembles that of *cast* brass than anything else I know of.



THE COMPRESSION OF THE STEEL IN FRONT OF THE TOOL.

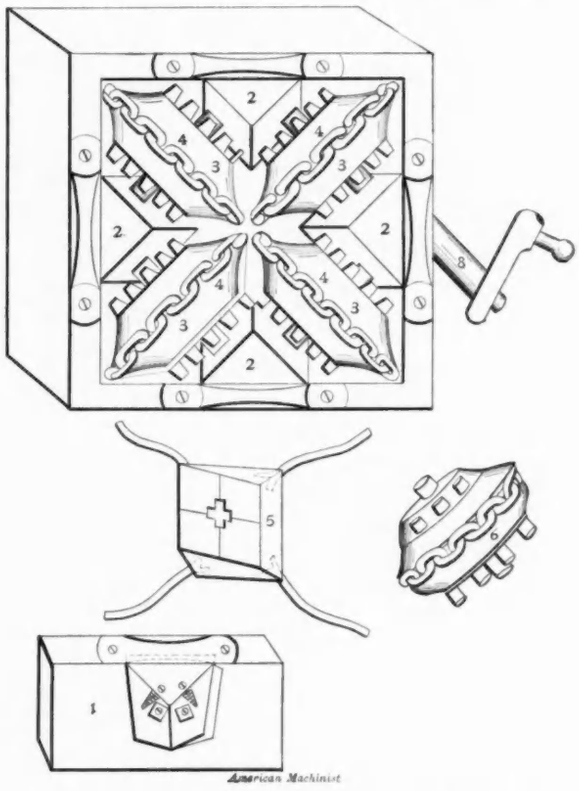
In ordinarily annealed steel, the chips generally come off in fairly long curls, and the surface of the work, if examined with a microscope, will be found to be more or less torn, no matter how sharp the tool may have been. I assume that this tearing is caused by the steel being so soft as to give way and push up into little hillocks just slightly ahead of the cutting edge of the tool, as in the sketch (which is of course exaggerated), and being pushed off rather than cut by the hillock clogging the point of the tool, the steel of which the work is composed not being sufficiently stiff in texture to withstand the pressure of the cut. This tearing is often very unpleasantly demonstrated in cutting a screw thread.

The water anneal appears to give the requisite stiffness of texture to prevent this tearing, and if toolmakers who have been troubled with torn threads in tool steel will try the water anneal, their troubles will vanish almost like magic. I have lately been cutting some very accurate threads in high carbon steel, and have found it impossible to get an untorn or correctly shaped surface with the steel in its raw or charcoal-annealed state, but with the work water annealed I have had no difficulty in getting practically perfect threads, both in shape and surface. That is, I got the threads within .0002 inch, both in depth and thickness. They were of the Whitworth shape, and from 12 to 50 per inch. I used soap suds as a lubricant, and could tell if the thread was smooth or not, simply by the character of the chips. If I saw them begin to curl, I knew that the work was being torn, and on examination it invariably proved to be so. The remedy was to re-anneal. If the chips came off in little bristles I knew everything was going on right.

It would be interesting to know exactly what chemical or molecular action the water anneal has upon steel. I cannot think it is a softening one, in the proper sense of the term. I should call it more of a stiffening or tightening up of the particles.

Charles H. Reynolds.

Leicester, England.



FROM AN OLD PATENT FOR MAKING WELDLESS CHAINS.

Chains Without Welding.

Editor American Machinist:

In speaking, on page 421, of the passing of welded link chains, you mention two patents recently granted to a German inventor for machines for rolling chains from bars of cruciform section as if they were a novelty. Patents No. 523,432, granted to Otto Klatte, July 24, 1894, and No. 339,781, to M. Jacker, April 13, 1886, both show machines for rolling chains; but the pioneer in this field seems to have been Christian Sleppy, of Newport, Pa., who received a patent September 27, 1853, No. 10,050, the drawing of which I enclose.

In the specification he says: "The rod may be round or square, with four flanges

to suit the guide." And he claims: "The forging and making of chains out of a solid bar without the welding process; and which is done instantly as the bar passes between four rollers with dies on the edges of the same, molding the links into form."

The rolls of the later patents are substantially like those of Sleppy, and the German inventor you mention must, at the best, have secured claims only on some minor feature. If it be true that weldless rolled chains are just becoming a commercial and practical fact, they only represent another good idea which has lain dormant nearly half a century. NOVICE.

A Section Liner Suggestion.

Editor American Machinist:

Referring to "A Section Liner," page 465, No. 17, the name of the writer of the article prompts this suggestion: Make the rectangular opening as long as possible, make the loose piece fit as neatly as consistent with easy movement and for common work throw away the T-square.

G. M.

And by His Teeth Ye Shall Know Him.

Editor American Machinist:

On Sunday morning, April 14, a stylishly dressed young fellow registered at the St. Nicholas Hotel, in Cincinnati, giving the name Royden Sims, of Ipswich, England. He went straight to work with the telephone, and used it to such advantage that shortly before 11 o'clock the same morning a party of machine tool men introduced themselves to him at the St. Nicholas, where they heard with satisfaction that he was a member of the firm of Ransomes, Sims & Jefferies, of Ipswich, over here partly for pleasure and also buying for his firm a number of machine tools to replace those destroyed by fire six weeks ago.

The writer (an Englishman) was one of the party, and was as far as any of the others from suspecting the genuineness of this Royden Sims. He seemed to know a great many people connected with engineering, both in this country and in England; posed as an Eton and Cambridge man; told us all about rowing No. 6 on the 'varsity crew, how he had recently fought in South Africa under the Earl of Denby, and many other things. He also showed us a letter from England purporting to give him authority to transact certain business for the son of the late Sir Joseph Whitworth, of Manchester. Altogether, he was exceedingly slick and smooth, and his knowledge of names and people in the engineering world was truly remarkable.

We entertained him royally throughout the day, but later had reason to suspect him, and before we saw him retire for the night, had him "guessing," and ourselves knew that he had been fooling us for upwards of twelve hours while enjoying our hospitality.

The next morning—to cut a long story short—he found it wise to leave town, and did so by the first train he could catch. The writer is now in receipt of the following letter from Ransomes, Sims & Jefferies, which explains itself:

"Ipswich, April 26, 1901.

"Dear Sir—We are very much obliged to you for having been so good as to write us, in your letter of April 15, respecting Mr. Royden Sims, who, you inform us, is representing himself as the son of the late Mr. Sims, of Ipswich. We at once telegraphed you as under:

"'R. S. unknown in this company.'

"The only son of the late Mr. Dillwyn Sims, of Ipswich, is Mr. John Dillwyn Sims, who is one of the directors of this company, as shown on the letter heading above. We have no knowledge whatever of Mr. Royden Sims, and we shall be much obliged if you will kindly make this fact known to any of your friends who may have had a call from this gentleman and who inquire of you in regard to him.

"We are, yours faithfully,

"RANSOMES, SIMS & JEFFERIES."

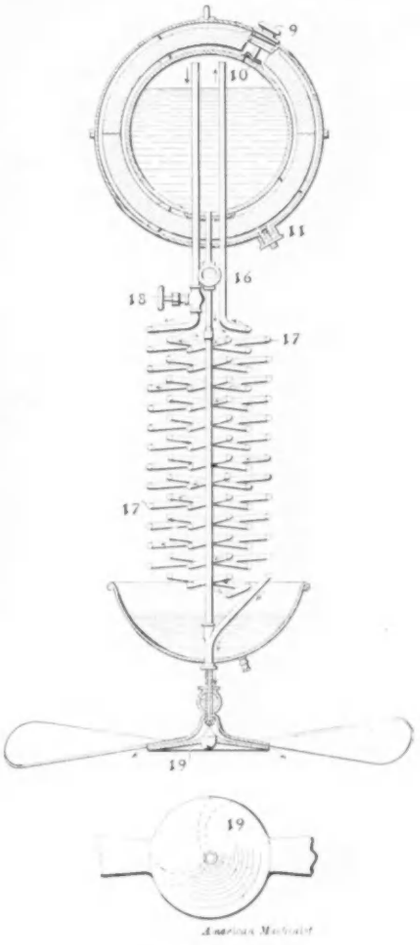
The following description will enable this so-called Royden Sims to be recognized: Age, about thirty-two; hight, 5 feet 8 inches; weight, 135 pounds (we weighed him); hair sandy and curly, but getting rather thin; eyes blue; face clean shaved; complexion sandy. By his teeth he can easily be recognized, having but two upper front teeth, both very long and prominent, one in the center and the other about ⅜ inch to the right of it. His manner is very off-hand and his accent most decidedly English. G. H. F.

Cincinnati, O.

A Liquid Air Motor.

The cut, from a recent United States patent, shows the essential features of an interesting device in which it is proposed to employ liquid air both for the development of power and for its refrigerative effect. The inventor is Mr. O. P. Ostergren, the inventor of an air-liquefying apparatus already in operation in this city.

At the top is seen the receptacle for the liquid air. This receptacle or reservoir consists of an inner and an outer shell with a considerable space between them in which is some suitable heat-insulating material, such as porous carbon, which is supported from contact with either the inner or the outer shell. The liquid air is poured into the reservoir through the opening 9-10, the inner opening 10 being closed by an outwardly opening check valve. As vaporization occurs in the inner reservoir, while air is not being used for power, it passes out through the check valve, along the space next to the inner shell and circulates through the porous insulating material, assisting in the maintenance of the low temperature and escaping by the safety valve 11, which is set to blow off at a pressure of two or three pounds. This pressure is the limit of the working pressure of the apparatus, and when valve 18 is opened the air, instead of passing out through the check valve and the safety valve, will pass down through the outer helical coil of pipe 17, where its temperature will be raised more or less, thus increasing its volume. From coil 17 the air passes into the central pipe at the bottom and then to the air-turbine 19, escaping through the curved passages indicated and causing the fan blades to revolve, the air mingling with the atmosphere of the apartment and reducing its temperature. As more air is required to



A LIQUID-AIR MOTOR.

drive the fan, valve 16 is opened and the liquid air passes down through the coil of smallest diameter and up through the next larger coil and through the vertical pipe to the air space at the top of the air reservoir, being by this transit entirely vaporized. From the air space of the reservoir it of course passes down the other pipe to the fan. It will be seen that by this apparatus the entire cooling effect of the air, in converting it from the liquid form to air of normal temperature, is used in the apartment, while sufficient power is developed to drive the fan. The valves 16 and 18 are of the needle type, giving a minute opening easily regulated.

COUNTRY TO WHICH EXPORTED.	Electrical Machinery	Metal Working Machinery.	Printing Presses and parts of.	Pumps and Pumping Machinery.	Sewing Machines and parts of.	Locomotive Engines.	Stationary Engines.	Boilers and parts of Engines.	Typewriting Machines and parts of.	Unclassified Machinery.
	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.
Austria-Hungary	1,163	189,856	. . . .	96,151	5,448	. . . .	. . . .	. . . .	17,230	64,341
Azores, and Madeira Islands	. . . .	. . . .	. . . .	68	333	. . . .	. . . .	. . . .	. . . .	1,359
Belgium	45,750	656,129	5,457	57,615	40,949	178,000	8,015	53,528	149,106	443,282
Denmark	742	53,038	8,398	32,349	335	3,000	10,929	5,978	16,239	242,279
France	266,470	1,090,046	6,262	237,168	138,392	384,980	30,876	29,673	177,440	616,254
Germany	107,531	2,479,939	90,633	364,839	1,016,591	27,375	7,313	29,580	454,625	818,396
Gibraltar	360	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	250	817
Greece	. . . .	. . . .	. . . .	3,064	30	. . . .	. . . .	280	. . . .	2,556
Greenland, Iceland, etc.	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	16
Italy	65,108	146,887	13,887	21,377	29,075	. . . .	3,605	3,263	53,996	155,134
Netherlands	1,623	141,489	16,474	59,537	207,665	. . . .	4,721	7,812	69,963	186,464
Portugal	5,075	6,050	1,900	1,781	189	. . . .	666	. . . .	278	9,669
Roumania	. . . .	462	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	610	140
Russia, Baltic and White Seas	35,772	122,490	8,100	139,659	16,557	274,661	8,027	12,498	167,483	400,555
Russia, Black Sea	1,400	2,099	. . . .	45,052	7,227	266,000	5,480	10,003	2,397	53,286
Spain	14,753	11,384	. . . .	3,508	5,345	11,696	4,393	7,416	4,787	28,751
Sweeden and Norway	7,409	199,068	18,147	41,830	833	55,000	15,331	10,293	12,495	318,796
Switzerland	43	20,008	. . . .	38	2,047	. . . .	. . . .	477	22,928	9,849
Turkey in Europe	. . . .	1,371	. . . .	2,990	93	. . . .	. . . .	500	1,543	10,828
United Kingdom	1,568,653	1,883,234	704,164	795,729	1,329,712	1,035,508	60,757	98,669	1,092,722	2,325,959
Bermuda	28	. . . .	103	1,719	1,616	. . . .	525	5,817	136	1,569
British Honduras	. . . .	. . . .	. . . .	460	3,264	. . . .	. . . .	1,103	305	3,312
Dominion of Canada—										
N. S., N. B., etc.	2,526	3,262	23,490	13,684	11,977	12,214	10,152	11,456	7,158	241,740
Que., Ont., Man., etc	750,797	42,042	130,121	112,824	152,664	351,726	52,847	211,883	42,285	3,243,334
British Columbia	47,100	60	7,917	29,387	24,864	17,383	41,611	67,455	5,482	444,687
Newfoundland and Labrador	. . . .	15	2,132	3,325	5,347	16,300	65	4,981	1,248	18,138
Central American States—										
Costa Rica	5,364	10	320	1,319	7,037	3,000	361	4,739	748	84,649
Guatemala	233	. . . .	29	1,335	221	. . . .	952	3,419	587	22,711
Honduras	255	. . . .	1,341	704	9,006	. . . .	950	2,584	539	30,128
Nicaragua	. . . .	1,285	432	1,256	11,233	3,700	. . . .	6,761	251	84,291
Salvador	. . . .	. . . .	. . . .	1,776	716	. . . .	1,798	1,468	834	33,704
Mexico	445,208	30,895	52,412	129,590	291,882	901,295	126,008	177,513	63,324	4,889,875
West Indies—British.	56,154	69	1,029	5,890	18,336	. . . .	3,100	18,334	6,225	98,638
Cuba	95,093	4,410	11,468	62,515	99,650	76,607	32,608	258,519	36,003	615,795
Danish	. . . .	. . . .	24	1,044	395	. . . .	100	828	181	30,209
Dutch	519	. . . .	686	773	808	. . . .	. . . .	1,335	327	1,681
French	. . . .	. . . .	. . . .	364	2,221	. . . .	275	. . . .	191	762
Haiti	. . . .	36	. . . .	334	1,576	. . . .	120	623	157	19,265
Porto Rico	5,788	. . . .	455	18,355	3,331	4,500	30,230	44,117	4,516	197,774
Santo Domingo	6,184	. . . .	320	3,205	3,432	22,385	1,524	18,387	452	115,576
Argentina	215,505	10,955	2,868	29,604	184,699	. . . .	39,550	50,281	36,946	306,534
Bolivia	. . . .	266	. . . .	521	8,637	. . . .	510	. . . .	. . . .	5,737
Brazil	87,058	9,099	1,162	16,124	135,522	151,941	36,686	72,295	11,719	173,547
Chile	132	1,131	2,881	4,494	21,010	33,200	2,619	11,936	12,640	105,182
Colombia	5,152	472	1,665	5,370	13,723	2,150	7,629	5,433	2,507	97,962
Ecuador	945	72	1,583	3,050	36,693	. . . .	855	3,500	1,868	50,981
Guianas—British	125	76	. . . .	2,612	1,607	. . . .	250	13,934	834	9,177
Dutch	519	283	. . . .	1,223	142	. . . .	. . . .	. . . .	130	12,232
French	. . . .	. . . .	. . . .	. . . .	1,114	. . . .	. . . .	74	50	100
Peru	8,515	2,204	4,149	7,314	59,424	36,100	1,874	15,474	4,240	115,443
Uruguay	. . . .	650	114	2,165	17,191	. . . .	500	325	2,784	24,446
Venezuela	9,391	. . . .	1,561	2,492	13,854	3,050	1,678	9,073	2,414	33,377
Aden	. . . .	. . . .	. . . .	. . . .	122	. . . .	. . . .	. . . .	. . . .	200
Chinese Empire	6,345	4,770	2,397	17,520	7,769	284,000	16,920	3,775	8,476	82,332
China—Russian	71	. . . .	. . . .	6,000	. . . .	. . . .	770	1,100	586	8,458
East Indies—British	29,050	8,326	1,940	56,496	6,355	316,840	5,899	12,263	17,321	153,851
Dutch	. . . .	3,044	. . . .	18,659	. . . .	. . . .	. . . .	3,445	1,165	43,064
French	. . . .	. . . .	. . . .	. . . .	620	. . . .	. . . .	. . . .	. . . .	. . . .
Hongkong	4,065	. . . .	1,105	7,423	12,426	. . . .	. . . .	397	5,068	48,766
Japan	102,944	37,399	30,550	53,124	11,706	202,981	12,706	36,724	17,446	554,521
Korea	. . . .	. . . .	733	. . . .	50	. . . .	. . . .	. . . .	200	29,002
Russia, Asiatic	175	. . . .	. . . .	1,393	984	714,200	1,510	139,355	879	99,664
Turkey in Asia	. . . .	. . . .	40	1,955	877	. . . .	364	757	130	3,173
All other Asia	723	. . . .	432	75	13,082	. . . .	2,055	. . . .	2,022	406
British Australasia	187,459	12,391	55,359	193,052	479,339	28,650	63,236	96,172	100,135	1,378,664
French Oceania	. . . .	. . . .	. . . .	30	4,014	. . . .	. . . .	. . . .	. . . .	2,918
Guam	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	30
Hawaii	5,230	1,900	4,142	219,374	47,363	7,625	12,247	131,693	9,018	2,031,394
Philippine Islands	91,213	10,410	. . . .	13,224	130	. . . .	. . . .	19,639	14,336	108,860
Tonga, Samoa, etc	. . . .	. . . .	. . . .	. . . .	45	. . . .	. . . .	. . . .	385	491
British Africa	46,163	1,423	1,051	137,136	7,585	30,000	1,160	22,601	23,569	510,104
Canary Islands	. . . .	. . . .	. . . .	. . . .	2,807	. . . .	. . . .	. . . .	. . . .	655
French Africa	803	. . . .	. . . .	532	. . . .	104,961	. . . .	. . . .	30	2,105
Liberia	. . . .	. . . .	. . . .	. . . .	197	. . . .	. . . .	. . . .	. . . .	263
Portuguese Africa	. . . .	2,100	. . . .	4,943	467	. . . .	1,440	1,492	4,840	15,528
Turkey in Africa—Egypt	2,272	. . . .	. . . .	10,786	759	30,375	. . . .	4,751	272	19,910
Tripoli	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .
All other Africa	. . . .	785	341	3,250	. . . .	. . . .	. . . .	. . . .	. . . .	16,874
Total (inc. few mis. countries)	4,340,992	7,193,390	1,219,774	3,112,525	4,541,774	5,592,403	673,197	1,767,856	2,697,544	21,913,202

United States Exports of Machinery for the Fiscal Year ending June 30, 1900, Shown according to Countries.

Some New Things.

A HAND DRILLER.

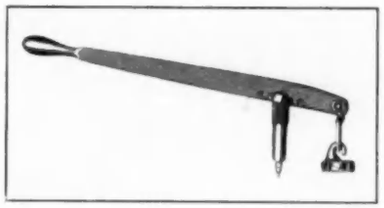
The cut shows a new hand drill especially adapted to lateral or cross drilling in pipes or bars. The chains may be passed around the piece to be drilled and hitched at any link, when the final tightening may be done by the hand-feed wheel

A HAND DRILLER.

of the drill. As the drilling proceeds the feed maintains the tension until the hole is drilled through. The drill frame may also be bolted or wedged fast to any convenient flat surface. The crank may be used to turn the drill constantly or with a ratchet movement. This drill is made by Upton & Gilman, Lowell, Mass.

A NEW LATHE CENTER GRINDER.

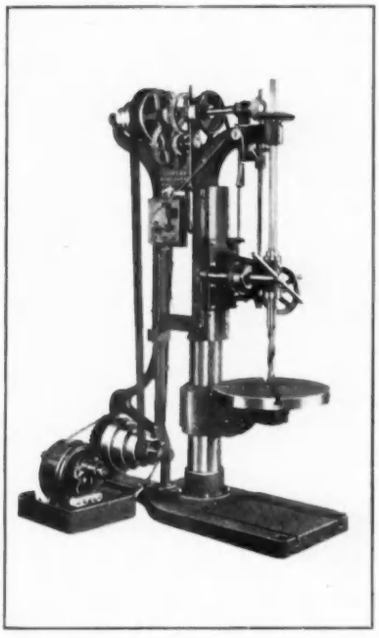
The half-tone shows, so clearly and completely that there is little call for explanation, a new lathe center grinder in position for use. The attachment is complete in itself and entirely self-contained. It clamps to the tail spindle regardless of its diameter, and when it is secured it is at once ready for use, and the grinding wheel is sure to shape the center accurately to the standard 60-degree angle. It will do this whether the tailstock is central or not. The large bevel gear, driven by the hand crank, meshes into a small bevel gear inside the large sprocket wheel, and the chain of the latter gives a high speed of rotation to the grinder. The spindle is moved back and forth longitudinally by the hand-wheel seen in front. The sliding bearing of the spindle is distinct from the rotary bearing, so that there is none of the lapping-out operation which so frequently ruins devices for this purpose. The rotary bearings are never uncovered and are entirely protected from the grit. The attachment is made by L. S. Heald & Son, Barre, Mass.



HALF-BOX EXTRACTOR.

A HALF-BOX EXTRACTOR.

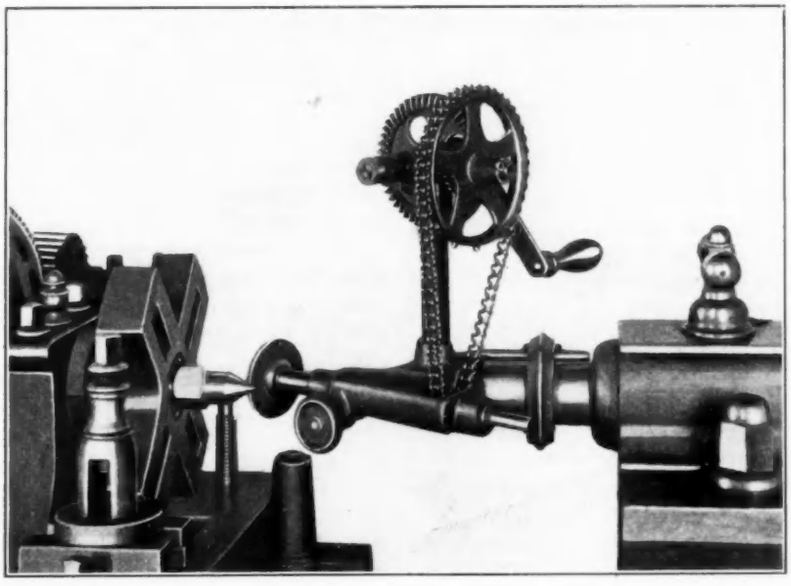
Mr. J. F. Whitney, of 57 Imlay street, Hartford, Conn., has devised a tool which he calls a "Half-Box Extractor" and which is used in lifting the upper half of the boxes of machine tools which ordinarily cannot be very well gotten at and which are too often raised by driving a chisel into the joint. This extractor consists of a block having three screws fitted to it with cupped heads formed in such a way as to leave a ring with a sharp edge upon it. This block is placed between the flanges of the box and the screws turned outward until the sharp edges cut into the flange of the box so that it is tightly held. Then the lever and link and hook are made use of to lift the half-box out of its place. The machinist's standard way of doing this work is to get a stick or bar under the cone pulley and pry it up, making the spindle lift the half-box, and there is usually no trouble in doing it this way, but in cases where for any reason the spindle cannot be disturbed the tool shown ought to be efficient and is said to be so.



ELECTRICALLY DRIVEN UPRIGHT DRILL.

The accompanying half-tone shows an adaptation of motor driving to an upright drill press. The motor is connected to the lower cone pulley spindle by pitch chain and sprocket wheels. A ventilated cast-iron box, not shown in the illustration, rests on the motor base and protects the motor from dirt and injury, and its top forms a convenient resting place for drills and work.

The starting box is attached to the rear upright and is operated by a cord and handle conveniently placed. The rheostat handle is fitted with a spring which opposes the pull of the cord and the pulley over which the cord passes is fitted with



A NEW LATHE CENTER GRINDER.

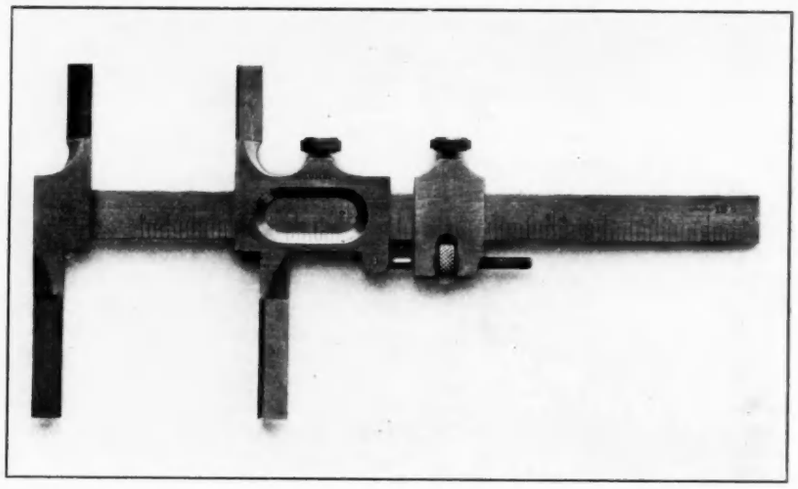
a chip which holds the cord from slipping back whenever it is released. In starting the motor it is only necessary to pull the cord gradually until the motor is up to speed when the clip holds the cord in that position. To stop the motor it is only necessary to release the gripping lever, when the spring throws the rheostat handle back and cuts out the motor. The machine is the product of J. E. Snyder, of Worcester, Mass.

MULTIPLE SPINDLE DRILL.

The illustration shows a two-spindle sensitive drill, the spindles of which are driven in an unusual way clearly shown by the engraving. The bevel gears are of course cut, and one for each pair is made of fiber to insure quiet running. By this plan the spindles are both belted by belts of equal length and no quarter-twist belts are necessary, as sometimes are used in other forms of driving. It is of course evident that any number of spindles may be arranged to be driven in the same manner. This machine is built by the Geo. Burnham Company, 21 Hermon street, Worcester, Mass.

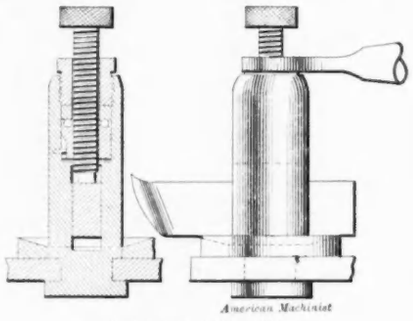
AN INSIDE AND OUTSIDE CALIPER.

The half-tone shows an improvement on the familiar beam caliper which will be understood without explanation. It is at once an inside and an outside caliper, the outside measure of the shorter arms always being identical with the inside measure of the longer arms. When the longer arms are set for the diameter of a shaft the shorter arms will indicate the diameter of the hole of a wheel to go on it, or *vice versa*. When the shorter arms are in contact the opening between the longer arms is ½ inch, and this difference is constant for all measures. The beam is graduated on both sides and a vernier scale is provided for minute adjustment.



AN INSIDE AND OUTSIDE CALIPER.

For outside calipering less than ½ inch the shorter jaws can be used. The caliper is made by E. G. Smith, Columbia, Pa.



A LATHE TOOL-POST.

The cut shows a tool-post as it is proposed to improve it in a recent United States patent. The binding screw, it will be seen, has only a knurled head and is operated by thumb and finger only. The nut in which this screw works is free to move up and down in a round chamber in the post, but is prevented from turning by a pin or feather projecting into a vertical groove in the side of it. On the upper side of the nut are a number of balls and above this a collar and upon that is a threaded bush which does not touch the screw, but fits an internal thread in the upper end of the post. The portion of this bush which projects above the post carries a permanent wrench. To tighten a tool the screw is first set down upon it as far as it will go with the fingers, and then the bush is turned by the wrench to tighten it. It does not appear very clear that the wrench could be any shorter here than the wrench usually employed on the tool-post, and such a wrench permanently attached to the post must often be in the way.

Large Engines for Manhattan Elevated Railway.

The Allis engines being installed for the new electrical equipment of the Manhattan Elevated Railway, of this city, are the largest yet built for street railway service, and for power to be developed are scarcely equaled by any engines, except the largest of the marine type; the design of the engines also is unusual if not entirely novel. There are to be eight engines of 8,000 horse-power each. They each have two horizontal high-pressure cylinders 44 x60 inches and two vertical low-pressure cylinders 88x60 inches. The cranks are on the ends of the shaft, set 135 degrees apart, which gives a very uniform torque, a high-pressure and a low-pressure piston both attaching to the same crank-pin. The exhaust from the high-pressure cylinders passes through large vertical receivers, which are also reheaters, to the low-pressure cylinders above, the exhaust from the low pressure passing to electrically operated independent jet condensers. The shaft is 37 inches in diameter and the crank-pins are 18x18 inches. The fly-wheel, or revolving field of the generator, is 32 feet in diameter and weighs 185 tons, making 75 revolutions per minute, which gives a piston speed of 750 feet. There are to be sixty-four Babcock & Wilcox boilers to supply steam for these engines, and these will be equipped with Roney mechanical stokers, which it is claimed will displace 200 firemen. At 13 pounds of water per horse-power hour the annual water consumption of the plant is estimated to be 5,700,000 pounds, which at current rates will cost $90,000.

The Summer School of the University of Wisconsin.

The University of Wisconsin has laid out a line of work for its summer school this year which is intended to meet the needs of mechanics and apprentices more fully than heretofore. Several courses have been laid out which comprise lectures and laboratory work in steam engineering, the management and testing of electrical machinery, electric wiring, telephony, electroplating and electrotyping, the use of elementary formulas, mechanical drawing, strength of materials, lubricants, etc. In-

struction will also be given in shop work in wood and iron, forging, founding and pattern making.

Professor J. B. Johnson, who has charge of the work, is deeply interested in the subject of industrial education, having been the chairman of the committee on that subject which recently made a report to the Society for the Promotion of Engineering Education. Recognizing the need of industrial education, he is endeavoring to use the facilities of the university in promoting that line of work. The work this year will be largely experimental. It is the aim to find if engineering colleges can do this work successfully during the summer season and if there is a demand for it, although the latter question would seem to be nearly answered already by the great number of inquiries received.

One feature of the plans in hand aims at co-operation with the correspondence schools by giving their students shop and laboratory practice which those schools are unable to do.

Full particulars may be obtained by addressing Professor Johnson at Madison, Wis.

An engine plant on the tenth floor seems like a reversal of the laws of nature, yet a 400-ton oil engine and generator plant has been arranged in that manner in Chicago, if we may credit a newspaper report printed there. The building is the cold storage warehouse of A. Booth & Co., and the reason assigned for elevating the power machinery so high was the impracticability of placing it under the cold storage plant. It would be interesting to know whether the argument for this was to avoid convection of heat.

The Bullock Electric Manufacturing Company, of Cincinnati, state that they feel that they are entitled to some recognition as the makers of the motor which forms an important part of the successful working combination of mechanical devices illustrated at page 515 under the title of "A Motor-Driven Shaper with Improved Feed Mechanism." We agree with them. The omission from the article was an oversight and we here do the next best thing.

Certain instructors at the Massachusetts Institute of Technology have arranged to give a supplementary series of courses of study during July and August this year. They will be open to persons not students who possess the necessary qualifications upon payment of fees. Further information can be had from H. W. Tyler, secretary of the Institute, Boston, Mass.

A writer in "The Blacksmith and Wheelwright" tells how to cut a saw blade as follows: "Don't take a cold chisel and dull it or break it, or break the saw where you don't want it to break; but take a tin shears and cut to the mark. If you have never tried this, try it and you won't lose any more time dressing chisels for that purpose or filing at the hard metal, nor break the blade in the wrong place. You can cut the hardest saw blade with a common tinners' shears and not damage it."

A French art critic has been praising our transatlantic cousins' taste in designing machinery. He says it shows "a distinct beauty of racial type," which is somewhat vague, but sounds pleasing. The artistic friend might have been content with this little flattery, because it is distinctly qualified by his idea of the American locomotive, in which he sees the "national character clearly marked." We had a better opinion of the American character.—"The Engineer."

Personal.

Daniel Davis, for over eight years master mechanic for the Standard Silk Company, of Phillipsburg, N. J., has resigned.

Frank M. Leavitt, M. E., recently mechanical engineer with the E. W. Bliss Company, has severed his connection with that company and opened an engineering office at 258 Broadway, New York.

F. Stuart Williamson, consulting structural engineer, has entered into a co-partnership under the firm name of Charles Henry Davis and Partners, with New York offices in the Broad Exchange Building, 25 Broad street.

Mr. Hollingworth, of Hutchinson, Hollingworth & Co., Ltd., loom makers, Dobcross, England, sailed for America, May 4, intending to be the guest of Mr. Hutchins, of the Crompton & Knowles Loom Works, Worcester, Mass., for a few weeks.

Miscellaneous Wants.

Advertisements will be inserted under this head at 25 cents a line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Gear Wheels, gear cutting. Grant; see p. 24. Caliper cat. free. E. G. Smith, Columbia, Pa.

Punches & dies. Wal.M.Wks.,Waltham,Mass.

Forming lathes. Mer.Mach.T.Co.,Meriden,Ct.

Wanted—Improvements in grinding machinery. Address Box 1435, Providence, R. I.

Barnes lathe, No. 6, 13x45, fine condition, very little used. Address S. K., care Am. M.

Light and fine mach'y to order; models and elec. work specialty. E. O. Chase, Newark, N. J.

Book "Dies and Diemaking," $1, post paid. J.L.Lucas,Bridgeport,Ct. Send for index sheet.

Wanted—Patternmaker's second-hand bandsaw, in good condition. Box 127, Am. Mach.

"Brandt's Triple Expansion Gaskets" are the best for boilers. Randolph Brandt, 38 Cortlandt st., New York.

Modern machine shop wants specialty to manufacture as side line. Address F. G. S., care American Machinist.

We do all kinds of light experimental model and special machine work; fair prices; satisfaction guaranteed. The Alcorn Machine Co., Waltham, Mass.

Automobile gear and body, ready to put engine in; used only 1 year with St. Louis gasoline engine; $40 cash f. o. b. Ft. Wayne, Ind. Address E. J. Kiss, Ft. Wayne, Ind.

Party desirous of retiring from well-established, paying machinery business invites correspondence; has controlling interest; will require $65,000. Address C. S. G., Box 103, Evanston, Ill.

Wanted—Space, 1,000 feet, with power, good light, suitable for medium weight machine tools; cleanly building, within 20 miles of City Hall, New York; give full particulars and rental. Address Box 126, Amer. Mach.

For Sale—To first purchaser, fifty shares preferred and twenty-five shares common stock of the Chicago Pneumatic Tool Co., at par value, $100 per share. Address C. H. Haeseler, 5137 Morris St., Germantown, Philadelphia.

Institutions retiring from business having machine tools, brass and wood working machinery will find it to their interest to correspond with us. We purchase complete plants or handle them on com. C. C. Wormer Mach. Co., 55-59 Woodbridge st., W., Detroit, Mich.

Wants.

Situation and Help Advertisements only inserted under this head. Rate 25 cents a line for each insertion. About six words make a line. No advertisements under two lines accepted, and no advertisements abbreviated. The cash and copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded. Applicants may specify names to which their replies are not to be forwarded; but replies will not be returned. If not forwarded they will be destroyed without notice. Original letters of recomendation or other papers of value should not be inclosed to unknown correspondents.

Situations Wanted.

Mechanical draftsman wishes position. Box 143, American Machinist.

Electrical and mechanical draftsman wants position. Box 140, American Machinist.

Experienced draftsman, technically educated, wants engagement. Box 152, Am. Mach.

Experienced mechanical draftsman wishes position. Address A. S., Box 144, Am. Mach.

Machinist draftsman (not afraid of work) wants position; could take charge. Address "Assistant," care American Machinist.

Mechanical draftsman wishes position in or near New York city; 5 years' office and shop experience. Box 133, American Machinist.

Wood and metal pattern maker; practical on globe and gate valves and pumps and sand molding machines. G. S., 74 Andrew st., Bayonne, N. J.

Having left my former position, I should like to hear from parties wishing a competent iron foundry superintendent or foreman. Box 416, American Machinist.

Mechanical engineer, practical mechanic of long experience, desires a position as superintendent with a reliable manufacturing company. Address Box 69, Amer. Machinist.

Mechanical engineer, a practical mechanic, experienced in organizing and superintending manufactures, is open for position; first-class references. Address Box 123, Am. Mach.

First-class mechanical draftsman, 14 years' experience, Corliss, Meyer valve engines, air compressor and heavy sawmill work, wants situation from June 1. Box 131, Am. Mach.

Office position with engineering or manufacturing firm wanted by young man (24) with 6 years' practical mechanical training; familiar with estimates, specifications and commercial law. Box 132, Amer. Mach.

Mechanical and civil engineer wishes change of position; technical graduate, 15 years' experience in engine, pump and building work with engine builders and steel works; used to handling men. Box 145, Amer. Machinist.

Designing draftsman, 17 years' experience on marine and stationary engines, special tools and jigs; experienced, reliable and systematic in charge of office; Eastern States preferred. Box 142, American Machinist.

Engineer's License.—Mechanics, engineers, firemen, electricians, etc.; 40-page pamphlet containing questions asked by Examining Board of Engineers sent free. Geo. A. Zeller, Publisher, Room 316, 18 S. 4th st., St. Louis, Mo.

By a first-class machinist, as foreman or superintendent; can use men to best advantage; get up new machines, tools and fixtures to save labor and make all drawings. Address G. A., care Hoggson & Pettis Mfg. Co., New Haven, Conn.

An expert toolmaker; has had 15 years' experience on fine interchangeable work; can establish correct form of thread for producing model thread gages, etc.; understands hardening and working hardened steel in all its branches. Box 141, American Machinist.

Superintendent, at present in charge of several hundred men on engines, pumps, etc., would like to correspond with parties contemplating the erection or remodeling of a large machine plant, where the services of an

(Continued on next page.)

New Corporations.

American Gasoline Motor Co., Chicago.; capital stock, $2,500. Incorporators: Joseph Schmidt, Jr., John H. Berkstressen and John W. Hill.

American Engineering Specialty Co., Chicago, Ill.; capital stock, $200,000. Incorporators: Jos. Mac Williams, Jas. H. Davis and Wm. B. Pickels.

Brooklyn Range Boiler Co., Brooklyn, N. Y.; capital, $40,000. Directors: Andrew Meurer, of Brooklyn, and D. S. Ramsay and W. G. Hoople, of New York city.

United Air Power & Refrigerating Co.; capital, $500,000. Incorporators: Frank D. Sturges, William H. Benedict and Isaac R. Robinson, all of New York.

The Mowry & Phillips Co., metals and machinery; capital stock, $200,000. President, Wesley Paul, of Saugus, Mass.; treasurer, W. H. Gulliver, of Portland, Me.

New York Labeling Machine Co., of New York city; capital, $100,000. Directors: Frank A. Acer and Wm. Ahern, New York city; Charles MacCarthy, Brooklyn.

Standard Time Stamp Co., of New York City; capital, $200,000. Directors: J. S. MacCoy, of New York city, and F. A. Marsh and F. H. Marsh, of Newark, N. J.

Combined Valve Co.; principal office, Arlington, N. J.; object, manufacturing valves; capital, $100,000. Incorporators: Edwin K. Conover, Ernest J. Sluter and Wm. H. Osborne.

Speed & Stop Indicator Manufacturing Co., of New York city; capital, $40,000. Directors: Frank Bayerdoerfer, A. Von Goeben, of Brooklyn, N. Y., and F. F. Hirsch, of New York city.

Clare Portland Cement Co.; principal office, the Corporation Trust Co. Building, Jersey City, N. J.; capital, $1,000,000. Incorporators: Horace S. Gould, John I. Billings and K. K. McLaren.

United States File Company; principal office, 5 Oliver street, Newark, N. J.; object, dealing in files; capital, $5,000. Incorporators: Allen J. Stephens, Orrin C. Benjamin, Joseph W. Callahan.

Equine Dental Machine Co.; object, to manufacture veterinary machines and supplies; capital, $10,000. President, John S. Miles, Brookline, Mass.; treasurer, Warren H. Berde, Lynn, Mass.

Beacon Metal Co.; principal office, Woodstown, N. J.; object, manufacturing anti-friction metals; capital, $150,000. Incorporators: Christian S. MacCain, Wm. S. Clawson, Samuel J. Taylor, F. Norman Dixon.

New Catalogs.

The Olds Motor Works, Detroit, Mich., manufacturers of gas and gasoline engines, motor carriages, trucks, etc., have sent us a catalog which is 9x6 inches.

The E. W. Bliss Company, Brooklyn, N. Y., has published a pamphlet showing a number of styles and arrangements of its straight-sided power presses. The catalog is designated No. 3 and is 5x7⅜ inches.

The Lake Shore Engine Works, Marquette, Mich., send us a catalog of the "Superior" gasoline marine engine which they make. It is shown constructed with one, two or three cylinders. Size of pamphlet, 9⅜x6 inches.

The Frank Machinery Company, Buffalo, N. Y., has published catalog No. 20 of woodworking machinery. It manufactures and carries a varied line of machinery for planing mills, etc. Size of page, 6¾x10¼ inches.

(Continued on next page.)

Situations Wanted—Cont'd.

able man are required to bring the product up to the American standard in quality and quantity; will contract from 1 to 3 years; no objection to locating in a foreign country. Address Box 96, AMERICAN MACHINIST.

Help Wanted.

Wanted—First-class pump shop foreman. Box 115, AMERICAN MACHINIST.

Wanted—Experienced men for responsible positions. Address James Brady, 220 Broadway, New York.

First-class all-around brass finisher; state experience and wages. "Permanent," Box 150, AMERICAN MACHINIST.

Wanted—First-class toolmakers and machinists; steady employment and good wages. Box 93, AMERICAN MACHINIST.

Wanted—A man thoroughly experienced with electric elevators, for outside erection. "X," care AMERICAN MACHINIST.

Wanted—Mechanical draftsmen; those accustomed to machine tool work preferred. Apply to Niles Tool Works Co., Hamilton, O.

One of the oldest machinery and supply houses in Ohio is looking for a traveling man who has had experience. Address "Supplies," care AMERICAN MACHINIST.

Wanted—Foreman for machine shop building slide valve and automatic engines and employing 40 to 50 machinists. Address L. R. R., care AMERICAN MACHINIST.

Wanted—Quick, all-around machinist; one who understands screw machines and making tools for same; state experience and wages. Box 149, AMERICAN MACHINIST.

Wanted—Machinists and machine hands willing to work ten hours; state age, experience, wages expected and give references. Address Buffalo (N. Y.) P. O. Box 733.

Wanted—Several experienced toolmakers for making dies by large works building electrical machines, near New York city; state experience. Box 129, AMERICAN MACHINIST.

Machinists—Two all-around men, experienced on marine work; good wages; nine hours. Address, with full particulars, references, etc., Box 130, AMERICAN MACHINIST.

Wanted—Patternmaker in Illinois town; one able to do the work and can read drawings; state age, experience and wages. Address L. F. M., care AMERICAN MACHINIST.

Wanted—Foreman for machine works, capable of handling from 40 to 50 men; must have technical education and shop experience. Address Atlanta Machine Works, Atlanta, Ga.

We invite application for machinists and molders; give references, experience and wages to start; work on steam engines and air compressors. Franklin Air Compressor Co., Franklin, Pa.

Wanted—Competent foreman for drafting room; state full particulars as to present employment, experience, etc. Address J. M. Birmingham, Supt. Columbia Bicycle Factory, Hartford, Conn.

Wanted—An experienced superintendent or foreman for a large machine shop doing all kinds of small work; must be ingenious, active and capable of handling men. Box 148, AMERICAN MACHINIST.

Wanted—Foreman for boiler shop; must be competent, reliable, energetic and familiar with latest methods of construction; state experience; give references. Address L. R. R., care AMERICAN MACHINIST.

We would like to arrange with a few traveling machinery salesmen to sell a new grinding machine needed in every machine shop; simple, cheap and a big seller. Address "Grinder," care AMERICAN MACHINIST.

Wanted—Competent designer, experienced on machine tool and jig work; state age, length of experience, with what firms previously employed and wages expected. The Bickford Drill & Tool Co., Cincinnati, O.

Salesman wanted on special machine tools, to be a practical mechanic and well up in modern machine shop practice; state age, where previously employed and salary expected. Box 147, AMERICAN MACHINIST.

Machinists and vise men who can work to drawing on small interchangeable work; state length of experience and with what firm previously employed; none but good men need apply. Box 114, AMER. MACH.

Wanted—Superintendent, first-class man, to take charge of operating department of a large modern stove foundry; exceptional opportunity, and salary commensurate with worth. "Davidson," care AMER. MACHINIST.

Draftsman wanted; one experienced in drawings for steam engines and general machinery; give age, experience and salary expected; a good, steady position in a small shop to the right man. Box 120, AM. MACH.

Wanted—Bench and floor machine hands for automobile and marine gasoline motor work, also young mechanics to break in as operators; give experience, reference and wages expected. Box 151, AMER. MACHINIST.

Wanted—Toolmakers familiar with such work as cash register, gun and watch tools; applicants please state experience and wages expected; do not apply unless familiar with work such as outlined above. Box 128, A. M.

We are enlarging our works, and will shortly require an increased number of skilled mechanics; we invite application from pattern makers, molders and machinists. Address the Westinghouse Machine Company, East Pittsburgh, Pa.

Wanted—The professor of mechanical engineering in one of the leading Western State universities desires to correspond with a man who is competent to give instruction in machine shop and foundry work. Address Box 146, AMERICAN MACHINIST.

Salesman wanted who thoroughly understands filter press business; only those having a thorough knowledge of the trade in the East need apply; excellent position and good salary for the right man. Address "Liberty," care AMERICAN MACHINIST.

Wanted—Shop manager; an experienced, thoroughly competent and trustworthy man as office manager, cashier, etc.; moderate salary with opportunity for advancement. Address, with full particulars, experience, age, salary now received, etc., Box 134, AMER. MACH.

Wanted—Five boilermakers in a non-union shop located in a Southern city of 20,000 inhabitants; healthy location; wages from $2.75 to $3; steady work and good treatment guaranteed; a shop where 140 men are employed. Box 118, AMERICAN MACHINIST.

Wanted—A man with some experience in shop and drafting room, to take charge of a small drawing office; technical graduate preferred; state age, present location, experience and references; we do not manufacture locomotives. Taunton Loco. Mfg. Co., Taunton, Mass.

First-class, experienced mechanical draftsmen wanted at once; some of them acquainted with electrical work; those with shop experience preferred. Apply, by letter, to Chief Draftsman, P. O. Box 911, Pittsburgh, Pa., stating experience in full and giving references.

Wanted—Assistant to superintendent; bright young man, technical graduate, as assistant to superintendent in manufacturing plant; light machinery; must be agreeable, thorough, painstaking and moderate in expectations. Address, in full detail, Box 138, AMERICAN MACHINIST.

Wanted—Assistant superintendent; an assistant superintendent or chief foreman in the manufacture of light machinery; good shop and agreeable surroundings; must be young, experienced and progressive; give full par-

This Portable Boring Bar Is a Handy Thing To Have

in the shop when there's boring to be done on Cylinders, Valve Seats, Cranks, etc. Saves tearing out and mussing around and pays for itself in short order. Make any size you want, you know. Hydraulic Presses and Pumps, too, for all purposes.

Ask for Bulletin No. 15.

CHAS. F. ELMES ENGINEERING WORKS, 250-258 Fulton St., Chicago, Ill., U.S.A.

Estab. 1863.